# A CALENDAR OF MATHEMATICAL DATES

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# JANUARY

## 1 January

4713 B.C. This is Julian day 1 and begins at noon Greenwich or Universal Time (U.T.). It provides a convenient way to keep track of the number of days between events. Noon, January 1, 1984, begins Julian Day 2,445,336. For the use of the Chinese remainder theorem in determining this date, see *American Journal of Physics*, 49(1981), 658–661.

46 B.C. The first day of the first year of the Julian calendar. It remained in effect until October 4, 1582. The previous year, "the last year of confusion," was the longest year on record—it contained 445 days. [*Encyclopedia Brittanica*, 13th edition, vol. 4, p. 990]

1618 La Salle's expedition reached the present site of Peoria, Illinois, birthplace of the author of this calendar.

1800 Cauchy's father was elected Secretary of the Senate in France. The young Cauchy used a corner of his father's office in Luxembourg Palace for his own desk. LaGrange and Laplace frequently stopped in on business and so took an interest in the boys mathematical talent. One day, in the presence of numerous dignitaries, Lagrange pointed to the young Cauchy and said "You see that little young man? Well! He will supplant all of us in so far as we are mathematicians." [E. T. Bell, *Men of Mathematics*, p. 274]

1801 Giuseppe Piazzi (1746–1826) discovered the first asteroid, Ceres, but lost it in the sun 41 days later, after only a few observations. Using his new technique of least squares, Gauss correctly predicted where it could be found. This made Gauss a celebrity. [DSB 5, 300 and 10, 591–592; Buhler, *Gauss*, pp. 40–45]

1806 France adopts the Gregorian calendar for the second time. See October 5, 1793.

192? G. H. Hardy sent the following New Year's wishes on a postcard to a friend: (1) Prove the Riemann hypothesis. (2) make 211 not out in the fourth innings of the last test match at the Oval. (3) find an argument for the nonexistence of God which shall convince the general public. (4) be the first man to the top of Mt. Everst. (5) be proclaimed the first president of the U.S.S.R. of Great Britain and Germany. (6) murder Mussolini. [DSB 6, 114]

1938 Hungary issued a stamp portraying Pope Sylvester II, Archbishop of Astrik. [Scott #511]

1962 The standard meter is redefined as "the length of 1,656,763.83 wave lengths of a certain type of orange colored radiation given off in a vacuum by the atom of krypton 86." [Martin Gardner, *Relativity for the Million* (1962), p 5].

1999 How would you write the Roman numeral for the antepenultimate year of the twentieth century? Should we write it purely additively as MDCCCLXXXXVIIII or should we use the subtractive principle and write MXMXCIX. Or do you prefer the mimimal solution MIM? This question stumped Marilyn vos Savant, who is listed in the *Guinness Book of World Records* under "Highest IQ." [*Prade Magazine*, 5 November 1989, p. 2]

2001 The first day of the 21st century. This is the answer to a good trivia question; 2000 is the last year of the 20th century and is a leap year.

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## 2 January

1663  The Republic of Venice offered Stefano DegliAngeli (1623–1697) the professorship of mathematics at the University of Padua, a post that Galileo held earlier. He was a student of Cavalieri who generalized the Archimedian spiral. See DSB 1, 164.

1697  In his New Year's greetings to Duke Rudolph August, Leibniz sent a "thought-penny or medal" showing his invention of the binary system. Leibniz argued that just as all numbers can be created from the symbols 0 and 1, so God created all things. [*The Monist* 26 (1916), p 561].

1738/9  At age 23, John Winthrop, former pupil of Isaac Greenwood, succeeded him as the second Hollis Professor at Harvard. [I. B. Cohen, *Some Early Tools of American Science*, p. 36]

1822  Rudolf Clausius born. He established the foundations of modern thermodynamics.

1879  West Point cadet J. W. Acton wrote in his copy of Charles Davies' *Algebra* (1877 edition) that he had been examined on logarithms and "fessed cold," which was cadet slang for flunking. Then he added this ditty:

> This study was ordained in hell
> to torment those who on earth dwell
> And it suits its purpose well
> Glory Hallelujah!!
> Amen! Amen! Amen!

Apparently Acton never mastered logarithms for he did not graduate from USMA.

1890  President Benjamin Harrison received, from the International Bureau of Weights and Measures in France, an exact duplicate of the standard kilogram; it is housed at the Bureau of Standards in Washington, D.C. [Thanks to Howard Eves]

1920  Isaac Asimov born. He has written more than 300 books, many of which deal with mathematics.

1947  Matt Weinstock's column in the Los Angeles *Daily News* began: "Readers of *Esquire* magazine [January 1948] … are slowly losing their minds over a story by Martin Gardner" entitled the "No-Sided Professor." This story is the first time that the Möbius strip, a one-sided surface, was used in a piece of fantasy. The story is reprinted in Gardner's *The No-Sided Professor* (1987), pp 45–58.

1979  Software Arts incorporated. They designed and programmed VisiCalc, the best-selling microcomputer program ever made.

## 3 January

1777  Birthdate of Louis Poinsot, discover of star polyhedra.

1870  Construction began on the Brooklyn Bridge.

1920  Zygmunt Janiszewski died. Later in 1920 the first volume of *Fundamenta Mathematicae*, which he founded, appeared. [Kuratowski, *Half Century of Polish Mathematics*, p. 33.]

1956  Israel issued the world's first postage stamp picturing Albert Einstein, the German born American theoretical physicist who invented the theory of Relativity. Naturally his famous equation $E = mc^2$ appears on the stamp. [Scott #117]

1977  Apple incorporated.

## 4 January

1754  Kings College, now Columbia University, founded in New York City.

1845  The Italian geometer Giusto Bellavitis (1803–1880) was appointed, via a competitive examination, full professor of descriptive geometry at the University of Padua. He held no degrees until the university awarded an honorary doctorate in philosophy and mathematics the following year. [DSB 1, 590]

1952  While still a movie actor and before he entered politics, Ronald Reagan wrote to a high school student who had asked advice on how to become a sports announcer (one of Reagan's earlier

jobs). In the letter Reagan confessed that he had a weakness in mathematics. [Eves, *Return to Mathematical Circles*, °33.]

1958 Sputnik I, the first artificial earth satellite, fell to earth. See October 4, 1957.

1987 The *New York Times* reported that an Energy Expo in Seattle unveiled "high-tech, energy-efficient buildings. ... Some of the judges' favorites include ... an office building with 'parabolic' lighting fixtures designed to focus light better than flat systems." Isn't it amazing how long it takes technology to catch up with theory?

## 5 January

1643 Isaac Newton born. It was Christmas day of 1642, old style.

1665 The first volume of the *Journal des Savants* appeared in Paris. [Muller]

1838 Birthdate of Camille Jordan.

1871 Federigo Enriques born in Leghorn, Italy. In 1907 he and Severi received the Bordin Prize from the Paris Academy for their work on hyperelliptical surfaces. [DSB 4, 373].

1871 Gino Fano born in Mantua, Italy. He was a pioneer in finite geometries [DSB 4, 523].

1874 In a letter to Dedekind, Cantor asks if the points in a square can be put in one-to-one correspondence with those on a line. "Methinks that answering this question would be no easy job, despite the fact that the answer seems so clearly to be 'no' that proof appears almost unnecessary." It was three years before Cantor could prove the answer was "yes". [DSB 3, 54]

1974 The famous grasshopper weather vane atop Faneuil Hall in Boston was removed by thieves, but later recovered. When a weather vane was fashioned for this famous trading hall of colonial Boston, the grasshopper was chosen as it appears on the crest of Sir Thomas Gresham, founder of England's Royal Exchange. He also founded the earliest professorship of mathematics in Great Britain, the chair in Geometry at Gresham College London. [Eves, *Adieu*, 28°]

## 6 January

1699 Newton wrote Flamsteed, probably alluding to Bernoulli's challenge of the brachistochrone problem, "I do not love ... to be dunned and teezed by forreigners about Mathematical things ..." [Westfall, 582].

1838 Telegraph first publically tested.

1887 Sherlock Holmes "born"—at age 33—in a short story, "A Study in Scarlet," published in London in the now defunct *Strand Magazine*. Mr. Holmes no longer lives at 221 B. Baker Street. "At the moment he is in retirement in Sussex keeping bees." All mathematicians should admire and emulate his deductive powers.

1900 Frege wrote to Hilbert: "Suppose we know that the propositions (1) A is an intelligent being, (2) A is omnipresent, (3) A is omnipotent, together with all their consequences did not contradict one another; could we infer from this that there was an omnipotent, omnipresent, intelligent being?" [Frege's *Philosophical and Mathematical Correspondence*]. [Thanks to Smoryński]

## 7 January

1610 Galileo discovered the first three moons of Jupiter (now ? are known), or the Medicean Stars, as he named them after his patron. (On January 7 and 13 he discovered the four largest ones [Tietze, p. 205].) The telescope seems to have been invented in Holland in 1608 and news of it spread quickly through Europe. Galileo constructed several telescopes and began observations in 1609. The discoveries of the Medicean Stars and the roughness of the moon, which was illustrated with woodcuts, were published in Galileo's *Sidereus nuncius* (The Starry Messenger) of 1610. These discoveries helped establish the Copernican theory.

1714 First typewriter patent issued (in England).

1791 Benjaman Bannaker arrived to begin laying out the boundaries of the District of Columbia. He did his first observations on Friday the 11th. The first two lines were completed on Saturday.

1871 Birthdate of Émile Borel. "In Paris as a scholarship student preparing for the university, he entered the family circle of G. Darboux through friendship with his son, saw the "good life" of a leading mathematician, and set his heart on it." [DSB 2, 302]

1810 Gauss wrote his astronomer friend Bessel: "This winter I am teaching two courses for three listeners, of whom one is only modestly prepared, one scarcely modestly prepared, and the third lacks preparation as well as ability. These are the *onera* of a mathematical professor." [Eves, *Squared*, 206°]

1947 President Henry Wriston of Brown University announced the establishment of a new department: History of Mathematics. It was then, and remains today, the only such department in the U.S. Otto Neugebauer (1899–1990) was named the first head of the department. Today the department is world famous for its work in ancient mathematics and astronomy.

1947 Harvard reveals development of the MARK II, the world's largest computer, capable of solving multi-digit multiplication problems in one second. [Leonard]

1981 Cathleen S. Morawetz, of the Courant Institute, delivered the 54th Gibbs Lecture entitled "The mathematical approach to the sound barrier." She was the first woman to be invited to give this prestigious address to the AMS.

## 8 January

1642 Galileo died.

1816 The public was disappointed that Sophie Germain did not appear at the awards ceremony for a prixe offered by the Institut de France on the mathematical theory of elastic surfaces. Germain received an honorable mention. [*Women of Mathematics. A Biobibliographic Sourcebook* (1987), edited by Louise S. Grinstein and Paul J. Campbell, p. 49]

1888 Courant born.

1889 P. Daniell born.

1889 Dr. Herman Hollerith of New York City received patent #395,782 for the first tabulating machine. It used punched cards and electrical counters operated by electromagnets. Its first extensive use was in the compilation of the population statistics for the eleventh U.S. census in 1890. See 1 June 1890. [Kane, p. 630]

1947 Norbert Wiener refuses to address a Harvard symposium on computers because they are used "for war work" and announces he will not publish work "which may do damage in the hands of irresponsible militarists." [Leonard]

1970 The Bangor *Daily News* contained this item with the headline "Had to Happen": "Hell, Norway (UPI)–The water froze in Hell Wednesday when the temperature dropped to 6 degrees below zero." [Eves, *Revisited*, 238°]

## 9 January

1587 Paul Wittich died. In 1580, with the help of Tycho Brahe, he rediscovered the method of prostaphaeresis. See 14 February 1468. [DSB 14, 274 and 470]

1793 The first successful free manned balloon flight in America took place over Philadelphia. George Washington viewed it.

1839 Henderson announces first stellar parallax.

1873 Birthdate of Hans Blichfeldt. When he graduated from Stanford in 1896 he didn't have enough money to go to Europe for a doctorate, as was then the custom, so he borrowed the money from a Stanford professor. In one year he received his doctorate, *summa cum laude*, from Leipzig. [DSB 2, 197]

1956 The Soviet Union issued a stamp commemorating the tenth anniversary of the death of Alexei N. Krylov (1863–1945), mathematician and naval architect. [Scott #1792]

1972 Mariner 9 transmitted black and white pictures of Mars back to Earth using the first order $(32, 6, 16)$ Reed-Muller code. See Chester J. Salwach, "Codes that detect and correct errors," *The College Mathematics Journal*, 19(1988), 402–416.

1984 When this date is written in the form 1/9/84, the year appears in full. January 9 is the unique date with this property and has it for all but one year of the twentieth century. [*Journal of Recreational Mathematics*, 2 (1969), p. 112]

## 10 January

1610

> "January ten, sixteen ten.
> Galileo Galilei abolishes heaven."

Bertolt Brecht [Thanks to Smoryński]

1765 When Frederick the Great saw Lambert for the first time he exclaimed that the greatest block-head had been suggested for his Academy. He based this opinion on Lambert's strange dress and behavior, but later he saw the "immesurableness of insight that Lambert possessed and so appointed him to te Academy on this date. [DSB 7, 597]

1844 George Boole submitted his first paper to the *Philosophical Transactions of the Royal Society*. The council of the Royal Society almost rejected it without looking at it because the author was unknown. After considerable argument it was sent to two referees—thereby setting a precedent of refereeing papers. One referee rejected it, the other recommended a special prize. In 1944 this paper was the first mathematics paper to receive a gold medal from the Royal Society. [MacHale, *George Boole, His Life and Work*, p 61].

1854 Riemann presents a paper to the philosophical faculty at Göttingen in which he challenged the mathematical world to redefine the concept of infinity to be either endless or unbounded. [George Martin, *Foundation of Geometry and the Non-Euclidean Plane*, Intext, 1975, p. 311. Thanks to Dave Kullman]

1855 By orders of the King of Hanover, the official court sculptor arrived at the home of the ailing Gauss to start work on a medallion. After Gauss died on February 23, a plaque based on this medallion was placed on his tombstone. Later, in 1877, a medal was issued bearing the phrase, "Mathematicorum principi" (to the Prince of Mathematicians), and ever since Gauss has been known by this name. [Eves, *Adieu*, 45°]

1911 Garrett Birkhoff and Howard Eves born in New Jersey. Later both studied at Harvard University. Professor Eves wrote me: "I accept this as proof of the nonsense of astrology—he became a very great mathematician whereas I did not." [HE]

1938 Donald E. Knuth born. Among his many contributions to computer science is the development of the computer driven typesetting language TeX, which has been used to produce this calendar.

1942 Peter Hilton arrived at Bletchley Park where he was greeted by the question "Do you play chess?" The "somewhat strange individual" who asked the question was the logician Alan Turing. Thus much of Hilton's first day of war service was spent solving a chess problem. The group of pure mathematicians at Bletchley Park was involved in breaking German codes during WW II. See Peter Hilton, "Reminiscences of Bletchley Park, 1942–1945," pp. 291–301 in *A Century of Mathematics in America, Part I*, especially p. 292.

1949 Ann Watkins born in Los Angeles. Today she is professor at Los Angeles Pierce College and editor of *The College Mathematics Journal*. Of her first love, teaching, she says: "It's often said that the best way to learn something is to teach it. That's certainly true about mathematics. If you can get the math clear enough in your heat to *explain* it to someone else, either orally or in writing, then you've really 'got it'." [Quoted from Karl J. Smith, *The Nature of Mathematics*, sixth edition, 1991, p. 646.]

1991 Here is one for those of you who have always distrusted statistics: "... according to a study conducted by Caroline Nielsen of the University of Connecticut. She followed 10 women who joined an expensive health club and another 10 who joined a 'simple' club; after three months, 63 percent of those who joined the no-frills club improved in fitness, compared with 25 percent for those at the luxury club." "It must be a joke, but I just don't get it." writes (on the computer net) Richard Griffith of Carleton University in Ottawa, Canada, who found it in the

*Globe and Mail*, page A18, Social Studies, Gyms: Less is More.

## 11 January

1672 Newton presents his telescope to the Royal Society of London. At the same meeting he was elected FRS. See 21 December 1671.

1707 V. Riccati born.

1775 Gaspard Monge (1746–1818) presents a memoir before the Academie des Sciences in which he made use of two planes of projection in his descriptive geometry. Descriptive geometry, which deals with the accurate two dimensional rendering of three dimensional solids, had been suggested by Frezier in 1738, but it is mainly to Monge that the mathematical theory owes its development. [Smith, *Source Book*, p. 426]

1787 Friedrich Wilhelm Herschel discovers the first two moons of Uranus, Titania and Oberon. [Muller]

1960 Committee convened to develop ALGOL 60.

1989 "We should dispel, once and for all, the nonsensical notion that mathematics is a man's game. The appearance of more women in mathematics in recent years is encouraging, but we need to do better in publicizing their successes." So wrote Edward A. Connors, chairman of the AMS Committee on Employment and Educational Policy, in an Opinion article in *The Chronicle of Higher Education* entitled "America's scientific future threatened by the decline in mathematical education." [*AWM Newsletter*, vol. 19, no. 2, p. 2]

## 12 January

1665 Pierre de Fermat, age 65, died without publishing a single mathematical work. However, because of his correspondence he was known as one of he best mathematicians in Europe.

1721 John Hadley showed up at a meeting of the Royal Society with a reflecting telescope six feet long which magnified 200 times and was made according to Newton's plan. [Westfall, 832]

1820 Founding of the Royal Astronomical Society of England. Charles Babbage was one of the founding members. [Goldstine, *The Computer from Pascal to von Neumann*, p. 10]

1853 C. Ricci born.

1898 Charlotte Agnes Scott wrote to to M. Carey Thomas: "I am most disturbed and disappointed at present to find you taking the position that intellectual pursuits must be 'watered down' to make them suitable for women and that a lower standard must be adopted in a woman's college than in a man's." At the time Scott, who received a "First Class" D.Sc. from the University of London in 1885, was a faculty member at Bryn Mawr. Thomas was president of Bryn Mawr and the first American woman to earn a doctorate in any field (linguistics from Zurich in 1882). [*Women of Mathematics. A Biobibliographic Sourcebook* (1987), edited by Louise S. Grinstein and Paul J. Campbell, 196-197].

1924 The first U.S. History of Science Society was organized in Boston "to encourage and maintain active interest in the history of science and the various sciences in particular." See 30 January 1925.

## 13 January

1610 Galileo discovers a fourth moon of Jupiter. See 7 Jan. 1610. [Muller]

1659 Hendrik van Heuraet sends van Schooten his rectification of the semi-cubical parabola. This was published—his only publication—in the second Latin edition of Descartes's *Geómétrie*. This resulet broke the spell of Aristotle's dictum that curved lines could not in principle be compared with straight lines. See DSB 6, 359.

1884 Leon Chwistek, Polish logician and painter, born.

1900 Birthday of Gertrude Cox, statistician. She died in 1978.

1902 Karl Menger born.

1911 A. V. Vasil'ev gave a lecture entitled, "Non-Euclidean Geometry and the Non-Aristotelian Logic." This is his claim to the discovery of three-valued logics. He did not work out the system in detail, so credit usually goes to Łukasiewicz. See March 7, 1918.

1984 This is the last leap year of the century with three Friday-the-thirteenths. They occur in a seven month period (January, April and July), the most densely packed that three can be. See July 13, 1984. When will this occur again?

## 14 January

1667/8 In his diary Samuel Pepys mentions a "very pretty, but not very useful" arithmetical machine devised by Sir. Samuel Morland (1625–1695 or 6). After a successful diplomatic career under Cromwell, Morland was appointed salaried "Master of Mechanics" to the King and devoted the rest of his life to instrument making. [Oldenburg *Correspondence*, 9, 432]

1687 Nicolaus Mercator died. In 1683 he accepted Colbert's commission to plan the waterworks at Versailles. Payment was contingent upon turning Catholic. This he refused to do and soon died of frustration and poverty. [Eves, *Circles*, 184°]

1746 Colin Maclaurin died at age 48. In 1745 he organized the defense of Edinburgh. With tireless energy, he planned and supervised the hastily erected fortifications, and, indeed, drove himself to a state of exhaustion from which he never recovered. [DSB 8, 611]

1753 Bishop George Berkeley died. In 1734 he published *The Analyst, Or a Discourse Addressed to an Infidel Mathematician* (namely, Edmund Halley). This work was a strong and reasonably justified attack on the foundation of the differential calculus. He called differentials "the ghosts of departed quantities." [Big Kline, p. 428]

1887 Hugo Steinhaus born. His *Mathematical Snapshots* is a delight to read, but get the first English edition if you can—there are lots of surprises there.

1901 Charles Hermite died.

1902 Alfred Tarski, logician, born. He defined truth.

1978 Logician Kurt Gödel, age 71, died at Princeton, N.J.

1980 Robert J. Griess, Jr. announced that he had constructed the conjectured sporadic simple group $F_1$ known as the "monster." This group consists 808,017,424,794,512,875,886,459,904, 961,710,757,005,754,368,000,000 square matrices each of size 196,883 by 196,883. This led to the completion of the classification of the finite simple groups. [*Mathematics Magazine* 53(1980), p. 253 and 54(1981), p. 41].

## 15 January

1704 Birthdate of Johann Castillon. His first two papers dealt with the cardiod, a curve which he named in 1741. [DSB 3, 119]

1827 Only once, in a book review of 1816, did Gauss hint publically at his ideas on non-Euclidean Geometry. On this date Gauss wrote his friend Schumacher that their published ideas were "besmirched with mud" by critics. [DSB 5, 302]

1850 Sonya Kovalevsky born. Her bedroom was wallpapered with the pages of a text from her father's schooldays, namely, Ostrogradsky's lithographed lecture notes on the calculus. Study of the novel wallpaper introduced her to the calculus at age 11. She became the greatest woman mathematician prior to the twentieth century. [DSB 8, 477]

1912 The Englishman Robert Falcon Scott arrived at the South Pole, a month after the Norwegian Amundsen. None of the party survived the trip back to the base camp, but Scott became a legend when his carefully edited diaries, discovered seven months after his death, were published. He despondently wrote "The Pole . . . is an awful place and terrible enough for us to have labored to it without the reward of priority." [*The National Geographic Society, 100 Years of Adventure and Discovery*, p 71.]

1934 Artificial radioactive substances are first produced by husband and wife Pierre and Marie Joliet-Curie.

1941 The *Des Moines Tribune* pictured Clifford Berry holding part of a machine that he and John V. Atanasoff were building to solve systems of simultaneous linear equations. They expected it to contain 300 vacuum tubes when completed. [Goldstein, *The Computer from Pascal to von Neumann*, p. 124]

1943 The five-story, five-sided Pentagon, the world's largest office building with 3.7 million square feet of office space, was completed after 16 months of round-the-clock labor.

1962 The death of Ivan G. Petrovsky was announced in Moscow.

1969 John Cocke, Michael Disney and Bob McCallister discover the first optical pulsar. Inadvertently they tape recorded their own voices so this is perhaps the only recording of a scientific discovery as it was taking place. The whole story is available as an audio-visual package "An optical pulsar discovery." [*Center for the History of Physics Newsletter*, vol. 16, no. 1, May 1984.]

## 16 January

551 BC. "Pythagoras discovers the triangle, thereby laying the groundwork for Rubik and his cube." From *366 Dumb Days in History* by Tom Koch.

1540 Phillip von Hutten wrote to his brother Moritz that Faust's astrological prediction of the failure of his venture in Venezuela was going to be correct. [Thanks to Smoryński]

1801 Birthdate of Thomas Clausen. In 1854 he factored the Fermat number $F(6) = 2^{2^6} + 1$ as 274177 times 67280421310721, thus providing another counterexample to a conjecture of Fermat. (Euler factored F(5) in 1732.) [DSB 3, 302].

1826 Neils Henrik Abel wrote his teacher and friend Holmboe: "The divergent series are the invention of the devil." [DSB 1, 15 and Big Kline, 973]

1831 In an audience with the King of Sardinia, Cauchy answered five questions with "I expected Your Majesty would ask me this, so I have prepared to answer it." Then he took a memoir from his pocket and read it. [DSB 3, 134]

1865 Founding of the London Mathematical Society. [Muller]

1905 The American Arithometer Corporation was acquired by Burroughs Adding Machine Company. See 21 August 1888. [Kane, p. 3]

1910 At six o'clock in the evening, Richard Courant was scheduled to be examined for his Ph.D. by Hilbert in mathematics, Voight in physics, and Husserl in philosophy. Hilbert arrived early and was anxious to get on with it so he could go home, but the others did not appear. Since Courant had written his dissertation under Hilbert, he had no need to probe Courant's mathematical knowledge, so they talked about non-mathematical things. After forty minutes, Husserl appeared. Hilbert excused himself and went home. After Husserl asked one question, Courant asked him to explain a delicate point in phenomenology. This took the remainder of the alloted time. Voight never appeared. Later several friends rented a horse-drawn carriage and hauled Courant around the quiet town of Göttingen while they blared over megaphones: "Dr. Richard Courant *summa cum laude!*" [Constance Reid, *Courant in Göttingen and New York. The Story of an Improbable Mathematician* (Springer 1976), pp. 33-34]

1913 Srinivasa Ramanujan, a 23 year old clerk in Madras, India, wrote G. H. Hardy, Professor at Cambridge, sending "a few examples of my theorems," and asking for advice. Although he was inclined to dismiss it as a letter from a crank, Hardy and his colleague J. E. Littlewood puzzled out some of the 120 formulas in the letter after dinner and concluded that Ramanujan was a mathematical genius. Hardy immediately invited Ramanujan to England, where they collaborated on a number of important papers in number theory [*Scientific American*, January 1988, p 112A; Hardy, *Papers*, 7, 704].

## 17 January

1706 Benjamin Franklin, American scientist, born. Years later when he observed a balloon launch by the Montgolfier brothers he was asked of what use it was. He replied: Of what use is a new born baby?

1868   Birthdate of Louis Couturat, a logician whose historical researches led to the publication of Leibniz's logical works in 1903. [DSB 3, 455–6]

1954   Leonard Eugene Dickson died.

1974   IBM introduces the first programmable calculator.

1985   The last day for the card catalog at the New York Public Library. It contained 10 million dog-eared cards in 9,000 oak drawers. It was replaced by 800 bound volumes of photocopies of the cards and a computer catalog. [AP press release, 18 Jan 1985.]

## 18 January

1663/4   King Charles II's letter which confirmed the Lucasian statutes forbade the Professor to take any but a Fellow-commoner as his pupil, and Newton was never that. Thus Newton was NEVER Barrow's pupil. This myth began after Newton's death with Conduitt's anecdote of Barrow examining Newton in Euclid as an undergraduate and finding him wanting. Newton did attend Barrow's lectures in 1665 but would not allow that they were helpful to him; Newton was self-taught in mathematics. [Whiteside, *Notes and Records of the Royal Society of London*, 19(1964), p. 61; Westfall, p. 99]

1802   Gauss read in the newspaper that Olbers had rediscovered Ceres. Gauss wrote to get the observations and a long friendship ensued. Gauss was such an avid newspaper reader that students nicknamed him the "newspaper bear" because of his habits in the library reading room. If someone was reading the paper he wanted he would sit glumly nearby and stare at them until they gave up the paper. See 1 Jan 1801.

1856   Birthdate of Luigi Bianchi, an Italian geometer who worked on non-Euclidean geometry. [DSB 2, 121]

1879   Birthday of the physician, Peter Mark Roget. In 1852, at age 73, he published his famous *Thesaurus of English Words and Phrases*. Roget also invented the log-log scale on slide rules.

1963   E. C. Titchmarsh died.

1982   Guyana (on the Northeast coast of South America) issued a series of postage stamps celebrating their conversion to the metric system. Can you name two countries that have not yet adopted the metric system? [Scott #338a–f]

## 19 January

1581   Andreas Dudith (1533–1589), mathematician and opponent of astrology, argued in a letter that observations of the comet of 1577 proved the Aristotelian explanation fallacious (for Aristotle, comets were accidental exhalations of hot air from the earth that rise in the sublunar sphere). Dudith's use of mathematically precise observations to criticize a general physical theory of Aristotle betokens Galileo's work fifty years later. [DSB 4, 213]

1833   Birthdate of Rudolf Clebsch who worked on invariant theory.

1736   Birthdate of James Watt, Scottish engineer.

1879   Fubini born.

1912   Kantorovich born.

1913   Robert Gauss of Denver and his brother Charles H. Gauss of Saint Louis both died on this date. They are grandsons of the mathematician Carl Friedrich Gauss [AMM 20(1913), 71].

## 20 January

——   Inauguration day in the U.S. in years congruent to 1 modulo 4. It is more likely to occur on Sunday than any other day of the week. See MT 78(1985), p. 66 for an explanation.

1590   Giovanni Battista Benedetti died. In one of his books he forecast his death for 1592. Hence, on his deathbed, he recomputed his horoscope and declared that an error of four minutes must have been made in the original data, thus evincing his lifelong faith in the doctrines of judicial astrology. [DSB 1, 605]

1831 Edward Routh born. He was a prominent teacher and coach for the Cambridge tripos who contributed to classical mechanics.

1834 William Watson born in Nantucket, MA. In 1862 he earned his Ph.D. at the University of Jena, being the first American to receive a Ph.D. in mathematics at a foreign university. Later he taught at Harvard and MIT. In the same year Yale was the first American school to grant a Ph.D. in mathematics (to J. H. Worall). [AMM, 43, 202; AMOS, 1906 ed.]

## 21 January

—— Earliest possible date for the beginning of the Chinese Lunar New Year.

1860 Birthdate of David Eugene Smith, historian of mathematics.

1874 René Louis Baire born.

1888 H. P. Babbage's Mill computes multiples of $\pi$.

1954 USS Nautilus, the first atomic-powered ship, launched.

1979 Pluto moves closer to the sun than Neptune.

## 22 January

1775 André-Marie Ampère born.

1874 Leonard Eugene Dickson born.

1880 F. Riesz born.

1889 Oskar Bolza gave his first lecture to a non-German audience. At Johns Hopkins University he gave twenty lectures "on the theory of substitution groups and its application to algebraic equations." This was the first course on Galois theory in this country. It was published in 1891 in the *American Journal of Mathematics*. [*Aus Meinem Leben*, p. 21].

1919 Richard Courant married Nina Runge in Göttingen. She was the daughter of the mathematician Carl Runge and granddaughter of the physiologist and philosopher of science Emil DuBois-Reymond. This provides another example of mathematical talent being passed from father to son-in-law. [Constance Reid, *Courant in Göttingen and New York. The Story of an Improbable Mathematician* (Springer 1976), p. 75–76]

## 23 January

1656 Blaise Pascal wrote the first of his eighteen *Provincial Letters*.

1862 David Hilbert born. [What more could you ask of one day?]

1961 23 Jan CBMS reported a serious of mathematicians in the United States.

## 24 January

1640 John Pell wrote Mersenne that Thomas Harriot (1560–1621) had found the law of refraction, now known as Snell's law. [DSB 6, 128]

1764 Fire gutted Harvard Hall, the last of Harvard's original buildings. The job of replacing the valuable scientific instruments housed in the building fell to John Winthrop, the second Hollis professor of mathematics and natural philosophy at Harvard. He was also friend and advisor of George Washington. [DSB 14, 452]

1798 Von Staudt born.

1848 Gold discovered in California. Jonas Clark soon was on hand with a wagon load of shovels and so made a wagon load of money. He used it to found Clark University in Worcester, MA, which in the early 1890's, had the strongest mathematics department in the country.

1984 Apple introduces the Macintosh computer.

1986 *Science* reported that a statistical analysis of word frequencies on a newly-discovered poem attributed to Shakespeare concluded "There is no convincing evidence for rejecting the hypothesis that Shakespeare wrote it." Otherwise said, the poem "fits Shakespeare as well as Shakespeare fits Shakespeare." [*Mathematics Magazine* 59 (1986), p 183].

## 25 January

1635 Cardinal Richelieu widens the scope of the Paris literary union (established 1625) to the Académie française. [Muller]

1736 Lagrange born.

1843 H. A. Schwarz born.

1870 H. von Koch born. He is noted for his snowflake curve.

1962 Professo Mina Reese, dean of graduate studies at CUNY, is named recipient of the MAA's first Award for Distinguished Service to Mathematics.

## 26 January

1126 Adelard of Bath translates Muḥammad ibn Mûsâ al-Khwârizmî's Astronomical Tables into Latin. [DSB 1, 62]

1678 Phillipe de LaHire nominated to the Academy of Sciences. This geometer was so adept at synthetic techniques that he, together with Rolle, was hostile to the infinitesimal calculus when discussions of its value were raised in the Academy beginning in 1701. See DSB 7, 577.

1738 Frederick the Great wrote Voltaire of his plan of study, "to take up again philosophy, history, poetry, music. As for mathematics, I confess to you that I dislike it; it dries up the mind. We Germans have it only too dry; it is a sterile field which must be cultivated and watered constantly, that it may produce". Nonetheless, Frederick supported Euler at the Berlin Academy from 1741 to 1766. See *AMM* 34 (1927), pp 122-130 for more on Frederick.

1784 In a letter to his daughter, Benjamin Franklin expressed unhappiness over the choice of the eagle as the symbol of America. Franklin's preference was the turkey.

1895 Arthur Cayley died, at age 74, after a long illness that he bore with courage and resignation. He continued his creative activity up to the week of his death. [Thanks to Howard Eves]

1802 Congress passed an act calling for a library to be established within the U. S. Capitol. The collection was the forerunner of the Library of Congress.

1862 Birthdate of E. H. Moore.

1952 EDVAC demonstrated. John Von Neumann was instrumental in designing this machine, which used the stored program concept.

1962 The United States launched the *Ranger III* spacecraft to land scientific instruments on the moon. The probe missed by some 22,000 miles.

1963 France issued a stamp picturing the bathyscaph "Archimede." Do you know why this name is appropriate? [Scott #1052]

1984 The Fredkin Foundation announced it will award a prize of $100,000 for the first major mathematical discovery made by a computer. [News release at the Louisville AMS meeting]

## 27 January

1520 Off the Patagonian coast near a small peninsula called Punta Tombo, during Ferdinand Magellan's voyage around the world, a crewman espied strange creatures swimming in the bay. He called them flightless geese, but scientists believe they were penguins of a sort classified as Spheniscus magellanicus. [NYT, July 10, 1983, Sect. 10, p. 3]

1695 Nicolaus II Bernoulli born.

1832 Charles Lutwidge Dodgson born. Although a mathematics professor he wasn't much of a mathematician. Mathematicians appreciate his Alice books, written under the pseudonym, Lewis Carroll.

1926 John Logie Baird gave the first demonstration of television.

1972 The director of a prestigious center for mathematical research at New York University died at age 84 of a stroke in New Rochelle, NY. Today it is named after him: The Courant Institute.

1987 The *New York Times* reported on a collection of over 5000 integer sequences that Neil J. A. Sloane of A. T. & T. Bell Laboratories has collected which occur with some frequency in mathematics.

Of course, they include the triangular numbers and the Fibonacci sequence. But they also include that famous sequence 14, 18, 23, 28, 34, 42, 50, 59, 66, 72, 97 consisting of the local subway stops on the West Side IRT.

## 28 January

1699 Leibniz elected the first foreign member of the French Academy. See February 21, 1699. [*American Journal of Physics*, 34(1966), p. 22]

1855 William Burroughs born.

1902 Carnegie Institute founded.

1977 According to the *Guinness Book of World Records*, the most freakish rise in temperature ever recorded was on this date in Spearfish, South Dakota. At 7:30 a.m. it was −4 degrees Fahrenheit; at 7:32 a.m. it was +45 degrees Fahrenheit. What was the average rate of change in temperature per minute? [*NCTM Sourcebook of Applications of School Mathematics*, p. 125]

## 29 January

1697 (o.s.) Newton received two challenge problems from Johann Bernoulli, one being the Brachistochrone problem published in *Acta eruditorum* the previous June and addressed "to the shrewdest mathematicians in the world." The next day Newton posted his solution to the Royal Society. When Bernoulli saw the anonymous solution he recognized it as "ex ungue leonem" (as the lion is recognized by his paw). [Westfall, 581–583; Hall, 105]

1700 Daniel Bernoulli born.

1810 Kummer born.

1884 The first part (A to ANT) of the *Oxford English Dictionary* was published. It was not completed until 1928. The longest article in the dictionary is the word "set." For a history of the dictionary and a biography of its author, James Murray (1837–1915), who wrote 7207 of its 15487 pages, see *Caught in the Web of Words* by K. M. E. Murray [pp. 214, 264].

1928 O. Timothy O'Meara born in South Africa. This expert in quadratic forms is now Provost at the University of Notre Dame.

1981 Sweden issued stamps portraying the mythological characters Thor, the thunder god, and Freya, the fertility goddess. Our days Thursday and Friday are named after these gods. [Scott #1346, 1349]

## 30 January

1619 Michelangelo Ricci born. In 1666, he found the tangent lines to the parabolas of Fermat. See DSB 11, 404.

1897 Mary Frances Winston elected to membership in the American Mathematical Society. The previous year she received her PhD at Göttingen, being the first American woman to receive a PhD in mathematics at a German university. [G. B. Price, *History of the Department of Mathematics of the University of Kansas, 1866–1970*, p. 70].

1841 Birthdate of Samuel Loyd, America's greatest puzzlist. In the 1870s he invented the 14-15 puzzle, which drove the population crazy trying to do it. The task is to arrange the 15 sliding tiles in the four-by-four frame so that tiles 14 and 15 are reversed. To show it impossible requires only a little group theory; see W. E. Story, "Note on the '15' puzzle," *American Journal of Mathematics*, **2**, 399–404. For samples of Loyd's many puzzles, see *Mathematical Puzzles of Sam Loyd*, edited by Martin Gardner, Dover 1959 [p. xi].

1884 Sonja Kovelevskiaya gives her first university lecturer. This was the first regular lecture by a woman at a research institution in any field in modern times. [*The Mathematical Intelligencer*, 6(1984), no. 1, p. 29]

1925 The U.S. History of Science Society was incorporated under the laws of the District of Columbia. The first president was Lawrence Joseph Henderson (1878–1924). The movement to form the society was begun by David Eugene Smith and today is the most important historical society in the world. See 12 January 1924. [Kane, p. 565 and *Osiris*, vol. 1(1936), p. 7]

1948 Iran issued five stamps with a surtax for reconstruction of the tomb of Avicenna (980–1037), Arab physician and philosopher, at Hamadan. [Scott #B1–5]

1988 *Science News* reports that Noam D. Elkies, age 21, of Harvard found four fourth-powers whose sum is another fourth-power, thereby providing a counterexample to a conjecture of Euler in 1769. The smallest number in his counterexample had eight digits. Later Roger Frye of Thinking Machines Corporation, Cambridge, MA, found the smallest counterexample:

$$95,800^4 + 217,519^4 + 414,560^4 + 414,560^4 = 422,418^4.$$

This took some 100 hours on a Connection Machine. Can you figure out how to verify this example using your calculator (which only displays 8 or 10 digits)? [*Mathematics Magazine* 61 (1988), p 130; *Science* 239 (1988), p 464].

## 31 January

1715 Giovanni Francesco Fagnano dei Toschi born in Italy. He was the son of the mathematician Giulio Carlo Fagnano. He calculated the integral of the tangent and also proved the reduction formula

$$\int x^n \sin x \, dx = -x^n \cos x + n \int x^{n-1} \cos x \, dx.$$

[DSB 4, 515, and 4, 513]

1802 Gauss elected a corresponding member of the St. Petersburg Academy of Science. See HM 4, 41. [Dunnington has 1801 on p. 58 but that is clearly wrong.]

1939 Hewlett-Packard founded. Their calculators use the "reverse Polish notation" devised by Jan Łukasiewicz.

1939 Joseph Ehrenfried Hofmann began his academic career as a professor of the history of mathematics at the University of Berlin. He is noted for his work on Leibniz, especially the book *Leibniz in Paris, 1672–1676: His Growth to Mathematical Maturity* (1974). [HM 2, 147]

1958 Explorer I, the first U.S. satellite, is successfully launched. [Air & Space]

2000 Since the year begins on a Saturday it will take six lines to print the January calendar. Such months are called perverse. The year 2000 is the next really perverse year with four perverse months—January, April, July, and December—the most possible. There is an inverse relationship between Friday-the-thirteenths and perverse months; so what is good for the calendar makers is bad for the superstitious. See *Scientific American*, Oct. 1969, pp. 129–130; Nov. 1969, p. 146; and Feb. 1970, p. 114.

# FEBRUARY

## 1 February

1650 Descartes contracted a chill, while tutoring Queen Christina of Sweeden, which developed into inflamation of the lungs. 10 days later he was dead at age 53. [J. F. Scott, *The Scientific World of Rene Descartes*, p. 6.]

1673 Leibniz, during his first visit to London, exhibited his calculating machine to the Royal Society. See Hofmann, *Leibniz in Paris*, p. 24, for details.

1788 Steamboat patented.

1890 Birthdate of Jovan Karamata, who worked on infinite series.

## 2 February

1522 Ludovico Ferrari born in Bologna, Italy. In 1536 he was sent to live with Girolamo Cardano, who taught him Latin, Greek, and mathematics. He collaborated with Cardano in research on third and fourth degree equations. [DSB 4, 586].

1666 The great fire of London began. Had it not occured, Christopher Wren would have been known as a mathematician rather than an architect. [Eves, *Circles*, 186°]

1786 Jacques Phillipe Marie Binet born in Rennes, France. He worked in mechanics, perturbation theory, determinants, electricity, and calculus. He would be better known today had he not been overshadowed by his famous contemporaries: Cauchy, Fourier, etc. [Grattan-Guinness, 1990, pp. 191 and 372]

1823 Gauss completes the "Gauss-Markov Theorem."

1881 Gustav Herglotz born. He worked in differential and integral equations, function theory, differential geometry, and analytic number theory.

1903 Bartels Van der Waerden born. This famous algebraist is best known for his book *Moderne Algebra*, but has, more recently, done interesting work on the history of ancient mathematics.

1970 Philosopher, social reformer, mathematician, and logician Bertrand Russell died in Wales.

## 3 February

1692 De la Pryme records in his diary that Newton had a fire in his study that destroyed the manuscript of his *Optics*. "Every one thought he would have run mad; he was so troubled . . ." [*Books* by Gerald Donaldson, p. 59]

1806 Lagrange presented an attempt to prove Euclid's parallel postulate to the mathematical and physical *classe* of the *Institute National* (as the *Académie des Sciences* was known during the French Revolutionary Period). Here is how Biot, who, incidentally, died on this date in 1862, recalled the embarrasing incident in 1837: "Then one day Lagrange took out of his pocket a paper which he read at the *Académie* [sic], and which contained a demonstration of the famous *Postulatum* of Euclid, relative to the theory of parallels. This demonstration rested on an obvious paralogism, which appeared as such to everybody; and probably Lagrange also recognized it as such during his lecture. For, when he had finished, he put the paper in his pocket, and spoke no more of it. A moment of universial silence followed, and one passed immediately to other concerns. [Grattan-Guiness, 1990, p. 263]

1821 Elizabeth Blackwell, first woman physician, born.

1898 Paul Urysohn born. This Russian mathematician worked in set theory and topology.

1961 Historian Gerald Holton echoed the words of Newton (5 February 1675/76) in opening a session of a meeting where three of the four speakers were Nobel laureates in Physics when he said "How good it is to be able to sit at the feet of giants on whose shoulders we stand." [*The Physics Teacher*, 26 (1988), p 264].

## 4 February

1753 Writing about his *Experiments and Observations on Electricity made at Philadelphia in America*, a work Diderot called the best example of the experimental art with which he was ac-

quainted, Benjamin Franklin boasted that he had "not, with some of our learned moderns, disguised [his] nonsense in Greek, clothed it in algebra, or adorned it with fluxions." [Thomas L. Hankins, *Jean d'Alembert*, p 4].

1964 ENIAC patent issued.

## 5 February

1575 Jan De Groot entered the University of Leiden, in the Netherlands, on its opening day. With Simon Stevin he later performed an experiment proving that bodies of different weights fall the same distance in the same time (published 1586 by Stevin). This anti-Aristotelian experiment anticipated Galileo's famous, but apocryphal, experiment at the Leaning Tower of Pisa. His son Hugo De Groot was a famous jurist. [DSB 4, 8]

1676 Newton wrote Hooke: "What Des-Cartes did was a good step. ... If I have seen further it is by standing on ye sholders of Giants." [DSB 10, 55; *The Correspondence of Isaac Newton* I, 416]

1772 Laplace presented his first probability memoir to the *Académie des Sciences.*

1796 Schiller (1759–1815) wrote to Goethe (1749–1832): "Wo es die Sache leidet, halte ich es immer für besser, nicht mit dem Anfang anzufangen, der immer das Schwerste ist." (I always think it better, whenever possible, not to begin at the beginning, as it is always the most difficult part). Although this is advice from one poet to another, it seems to apply to mathematics, especially the foundations of mathematics. Quoted from *Numbers* (1990) by H.-D. Ebinghaus et al., p. 6.

1797 Jean-Marie-Constant Duhamel born.

1840 The American Statistical Association held its first annual meeting, in Boston.

1850 D. D. Parmalee issued a patent for the first key-driven adding machine.

## 6 February

1465 Scipione del Ferro born in Bologna, Italy. Around 1515 he solved the cubic equations $x^3 + px = q$ and $x^3 = px + q$ when $p$ and $q$ are positive. His methods are unknown. This information was passed on to his son-in-law Annibale dalla Nave who was tricked into revealing it to Cardano, who published it in his *Ars magna* of 1545. [DSB 4, 595].

1612 Christopher Clavius, the Euclid of the sixteenth-century, died. He was also the leader of the Gregorian calendar reform. [DSB 3, 312]

1672 Newton wrote Henry Oldenburg about his optical theories, and Oldenburg published them a few days later in the *Philosophical Transactions*. The controversy that followed dissuaded Newton from publishing on optics—and also on the calculus—until 1704 [*ISIS*, 69, p 134].

1695 Nikolaus II Bernoulli born. He was the eldest son of Johann Bernoulli. When the father was asked to come to St. Petersburg to join the Academy, he declined because of his age. He suggested that they take his son Nikolaus, but, so that he not be lonely, they should also take another son Daniel. Unfortunately, Nikolaus II drownd in 1726, only eight months after going to St. Petersburg.

1802 Sir Charles Wheatstone, English physicist, born.

1828 George Biddell Airy appointed Plumian professor of astronomy at Cambridge at a salary of £500 per annum. He was appointed even after he raised a row that the previous salary of £300 was inadequate. For the previous two years he held the Lucasian professorship—the post Newton held—at a salary of £99. [DSB 1, 85]

1930 Kurt Gödel received his Ph.D. from the University of Vienna for a dissertation, directed by Hans Hahn, that showed the completeness of first order logic (every valid first-order formula is provable). [Dawson; Wang, JSL, 46, 653–659]

1959 Kilby patent filed for integrated circuit.

## 7 February

1877 Godfrey Harold Hardy born in Cranleigh, Surry, England.

1883 Eric Temple Bell born. Although he was a well known mathematician in his day, he is best remembered for his popular *Men of Mathematics*. This book is hated by historians of mathematics for its exagerations and inaccuracies, but it is loved by high school students, and has motivated many mathematicians to become mathematicians. If you have not read it, do!

1885 Hilbert promoted to Ph.D. He defends Kant on *a priori*. [Reid's *Hilbert*, p. 16]

1975 Hungary issued a stamp commemorating the bicentenary (they were two days early) of the birth of Farkas Bolyai (1775–1856). [Scott #2347]

## 8 February

1587 Mary, Queen of Scots, was beheaded after Sir Francis Walsingham did a frequency count on Mary's cipher, read her message, and uncovered her plot to asassinate Elizabeth I, Queen of England. [*NCTM Student Math Notes*, January 1983, p. 3]

1700 Daniel Bernoulli born.

1853 Alexander Ziwet born in Breslau. He became professor at the University of Michigan, an editor of the *Bulletin of the AMS*, and a collector of mathematics text who enriched the Michigan library. [Müller]

1875 Birthdate of Thomas Bromwich. G. H. Hardy described him as the "best pure mathematician among the applied mathematicians at Cambridge, and the best applied mathematician among the pure mathematicians." [DSB, 2, 490]

## 9 February

1775 Farkas (Wolfgang) Bolyai born. He spent much of his time trying to prove the parallel postulate, so when he learned that his son, Janos Bolyai (1802–1860) was also interested in the problem, he wrote him: "For God's sake, I beseech you. Fear it no less than sensual passions because it, too, may take all your time, and deprive you of your health, peace of mind, and happiness in life." [Boyer, *A History of Mathematics*, p. 587]

1880 Lipót [Leopold] Fejér born in Pécs, Hungary. In 1897 he won a prize in one of the first mathematical competitions held in Hungary. He became a distinguished analyst. He died in 1959. [DSB 4, 561].

1883 Henry John Stephen Smith, Savilian Professor of Geometry at Oxford, died (born 2 November 1826). He posthumously received the Grand Prix des Sciences Mathématiques of the Paris Academy of Science for his proof that every positive integer is the sum of five squares. He shared the prize with the eighteen year old Hermann Minkowski. [DSB 9, 411 and 12, 469; Reid's *Hilbert*, p. 12]

1883 The very first issue of Science is published. The first item in the "Weekly summary of the progess of science" contains a report by Thomas Craig that "Lindemann gave a proof of the fact that $\pi$ cannot be a root of an equation of any degree with rational co-eficients. This is a most remarkable paper, as it thus contains the first direct, absolute proof that has ever been given of the impossability of the quadrature of the circle. ... Lindemann has certainly done a splendid piece of work in thus absolutely proving the impossibility of 'squaring the circle'; and it is only to be regretted that his work will not carry conviction to the minds of those mistaken individuals, the 'circle-squarers.' But it is hardly to be supposed that they will be convinced of the futility of their task, any more than the perpetual-motion inventors were convinced by the discovery and enunciation of the principles of the conservation of energy." [p. 15]

1891 U.S. Weather Bureau founded.

1979 A student discovered the largest then known prime. He was one of the people who broke the previous record on 30 October 1978.

1986 Halley's comet returned to perihelion.

## 10 February

1676/7 "The truth of it is, mathematical learning will not go off without a dowry; the booksellers have lost so much by the works of Drs. Wallis and ... Barrow ... that it is no easy task to persuade

booksellers to undertake any thing but toys that are mathematical." [Collins to Baker, *The Correspondence of Isaac Newton*, Vol. 2, p. 192]

1747 Aida Yasuaki born. In 1788 this Japanese mathematician published a collection of geometry problems in a new and simplified symbolic notation. [DSB 1, 83]

1891 Sonya Kovalevskaya, professor of mathematics at Stockholm, died of pneumonia.

1914 The Girl Scout's patent the trefoil design for their membership badge.

1946 War Department revealed the development of ENIAC, an electronic numerical integrator and computer. It is 1000 times faster than human computation. [Leonard]

## 11 February

1141 Hugh of St. Victor died. For him the word "mathematica" had two meanings: When the 't' is not aspirated it means "the superstition of those who place the destiny of men in the constellations" of the heavens; when the 't' is aspirated it means the science of "abstract quantity." [DSB 6, 544]

1650 Descartes died. His lifelong habit of laying abed till noon was interrupted by Descartes' new employer, the athletic, nineteen-year-old Queen Christiana of Sweden, who insisted he tutor her in philosophy in an unheated library early in the morning. This change of lifestyle caused the illness that killed him. [Eves, *Circles*, 177°]

1731/2 George Washington born. As England did not change to the Gregorian calendar until it omitted September 3–13, 1752, his birth is recorded on the old style (Julian) calendar; it corresponds to February 22, 1732 new style (Gregorian). The "slash date" 1731/32 is used because the civil year began on March 25 in England at that time; so it was 1731 in England and 1732 on the continent. [Sanford, *Mathematics Teacher*, 1952, p. 338]

1826 Founding of the University College of London. [Müller]

1839 J. Willard Gibbs born. Gibbs studied at Yale, Paris, Berlin, and Heidelberg before becoming Professor of Mathematical Physics at Yale. He was one of the inventors of vector analysis, and discussed the "Gibbs Phenomenon" in the theory of Fourier Series.

1847 Thomas Alva Edison born.

1897 Emil Leon Post was born in Augustów, Poland. Like almost all logicians who did important work in propositional logic, he was born in Poland. His family came to the U.S. in 1904 and he went on to become a distinguished logician. In his 1920 Ph.D. dissertation he proved the consistency and completeness of propositional logic. [DSB 11, 106]

1897 Indiana bill to fix the value of $\pi$ was defeated in the senate. The bill specified several values for $\pi$ to simplify computation.

1986 Soviet Jewish dissident, mathematician and computer expert, Anatoly Shcharansky was released by the Soviet Union in an East-West spy swap. Shcharansky, who helped run a committee monotoring human rights abuse in the Soviet Union, had been jailed since 1978 on charges of spying for the CIA. [UPI press release]

## 12 February

1809 Abraham Lincoln, sixteenth U.S. president, and Charles Darwin, naturalist, born.

1824 Goethe praises Lagrange in a conversation with Eckermann: "He was a *good* man and great for just that reason. For when a *good* man is gifted with talent, he will always exert a morally positive influence as an artist, a scientist, a poet, or whatever else it may be." [J. P. Eckermann, *Conversations with Goethe*; Thanks to Smoryński]

1826 Lobachevsky delivered a paper before the mathematics and physics departments of Kazan University on his "imaginary geometry." He died on this same date in Kazan in 1856. [H. E. Wolfe. *Introduction to Non-Euclidean Geometry*, p. 53–56; thanks to Kullman]

1914 Hanna Neumann born in Berlin. In 1938 she left her graduate studies in Göttingen to join her future husband, the mathematician Bernhard Neumann, in England. She completed her D. Phil. at Oxford, working with Olga Taussky-Todd in combinatorial group theory. In 1955

she received the D.Sc., the higher doctorate, also at Oxford. Later she became a leading figure working on varieties of groups. Three of her four children are mathematicians. For more information see, Louise S. Grinstein and Paul J. Campbell, *Women of Mathematics. A Biobibliographic Sourcebok* (1987), 156–160.

1916 Richard Dedekind died, in his 85th year. See 4 September 1899.

## 13 February

1535 During the night of February 12–13 Tartaglia discovered a method of solving cubic equations that enables him to beat Fiore in a contest. [B. L. van der Waerden in the film, "The Great Art: Solving Equations"; Thanks to Kullman]

1635 The oldest public institution in America, the Boston Latin School, was founded.

1678 Brahe gives first account of Tychonian system.

1741 The *American Magazine* published its first issue, being the first magazine published in the American colonies, edited by John Webbe (fl. 1730–1750) in Philadelphia. It precedes Benjamin Franklin's *General Magazine* by three days to claim the distinction. In print for only three months, this monthly periodical covered the proceedings of colonial government, as well as moral, political, and historical topics.

1805 Birthdate of Gustav Peter Lejeune Dirichlet. He was precociously interested in mathematics, even using his pocket money to buy mathematical books before the age of 12. Because mathematics in Germany was at a low ebb he studied in Paris from 1822 to 1826. As he earned no doctorate the University of Cologne awarded one *honoris causis* so that he could teach in Germany. He was an excellent teacher. [DSB 4, 123–124]

1883 Richard Wagner died. His life was filled with thirteens: his name contains 13 letters; he was born in 1813, the sum of whose digits is 13; he composed 13 great works of music; *Tannhauser* was completed April 13, 1845, and first performed March 13, 1861. See Eves, *Adieu*, 294°, for other examples. Which of these dates were Fridays?

1933 Flapper Blondie Boopadoop married playboy Dagwood Bumstead.

1973 The German Democratic Republic issued a stamp picturing Copernicus and the title page of his *De Revolutionibus*, which was published 500 years ago in 1573. [Scott #1461]

1998 Friday-the-thirteenth. Since this is an ordinary year, February has only 28 days, so next month there will again be a Friday-the-thirteenth. These are the only two consecutive months that can have Friday-the-thirteenths.

## 14 February

—— The equation for the day is $(R - 1 + \sin \theta)(\pi/3 - \theta) = 0$.

1468 Johann Werner, discoverer of prosthaphaeresis early in the sixteenth century, born. See 9 January 1587.

1747 Founding of the École des Ponts et Chaussées (The School of Bridges and Roads) in Paris. Many famous French mathematicians were students there. [Müller]

1814 Laplace presented his *Essai phlosophique sur les probabilités* (A Philosophical Essay on Probabilities) to the *Académie des Sciences* in Paris.

1832 Gauss to Gerling: "Let me add further that I have this day received from Hungary a little work on the Non-Euclidean geometry, in which I find all *my own ideas and results* developed with greater elegance, although in a form so concise as to offer great difficulty to anyone not familiar with the subject. ... I regard this young geometer [Janos] Bolyai as a genius of the first order." [G. E. Martin, *Foundations of Geometry and the Non-Euclidean Plane*, p. 309]

1839 Hermann Hankel born. Hankel studied at Leipzig, Göttingen, and Berlin and was later Professor at Erlangen and Tübingen. He worked in Function Theory and the History of Mathematics.

1877 Edmund Landau born. Although famous as a number theorist, he is best known for his textbooks which are written in an austere definition-theorem-proof style. His *Grundlagen der Analysis* is an excellent treatment of the development of our number systems from the Peano pos-

tualates. Reading this book is a good way to learn mathematical German. But if you are lazy, it has been translated into English.

1981 The first computerized wedding took place. The couple recorded their vows on an Apple computer.

## 15 February

1564 Italian astronomer and physicist Galileo Galilei born. On the same day Michelangelo died. Both are buried in the same church in Florence in similar grand tombs, showing that in their in their own times they were of equal stature.

1671 James Gregory wrote Collins that he found infinite series for the tangent and secant functions:

$$\tan x = x + \frac{1}{3}x^3 + \frac{2}{15}x^5 + \frac{17}{315}x^7 + \cdots$$
$$\sec x = 1 + \frac{1}{2}x^2 + \frac{5}{24}x^4 + \frac{61}{720}x^6 + \cdots$$

You should get out your calculus and verify these results. [Big Kline, 438]

1820 Feminist pioneer, Susan B. Anthony, born. Many complain that the Susan B. Anthony dollar is too near in size to a quarter to tell them apart. Is this correct? Compare the ratio of the diameters of a nickel and a quarter to that of a quarter and a dollar. What do you observe?

1785 Claude Navier born in Dijon, France. Although Navier placed 116th out of 117 when admitted to the *École Polytechnique* in 1802, he became distinguished as an engineer interested in mathematical physics. Today he is best remembered for his work on viscous fluids, the Navier-Stokes equaltion (1922).

1861 Philosopher and mathematician, Alfred North Whitehead, born.

1882 Birthdate of Paul Koebe, who worked on conformal mappings.

1946 ENIAC, the first large-scale electronic digital computer, was demonstrated and dedicated by the U.S. Army at a ceremony in Philadelphia. It was developed by John W. Mauchly and J. Presper Eckert.

1958 France issued stamps honoring Joseph Louis Lagrange, Urbain Jean Joseph Leverrier, Jean Bernard Leon Foucault and Claude Louis Berthollet. [Scott #869–872]

1970 Martin Davis telephoned Julia Robinson from New York that John Cocke had just returned from Moscow with the report that the 22-year old Leningrad mathematician Yuri Matijasevič had solved Hilbert's tenth problem. The problem asked for an algorithm to solve all Diophantane equations. Matijasevič showed no such algorithm exists. [*The College Mathematics Journal*, vol. 17 (1986), p. 19; *More Mathematical People* (1990), edited by Donald J. Albers, G. L. Alexanderson and Constance Reid, p. 276]

1971 The United Kingdom changed to a decimal system of currency. Previously the British pound was worth 20 shillings, each of which was 12 pence (plural of penny). [Eves, *Revisited*, 85°]

1980 The U.S. issued a 15¢ stamp in its Black Heritage Commemorative Series honoring the mathematician and astronomer Benjamin Bannecker (1731–1806). He is pictured beside a transit, for he was L'Enfant's chief assistant in laying out the city of Washington, D.C. More importantly, he determined the boundaries of the district. At the annual NCTM meeting in Chicago in 1988 the Bannecker Association, which promotes the education of Black students, distributed buttons with a picture of this stamp. They were a great hit. [Scott #1804]

## 16 February

1514 George Joachim Rhaeticus born in Feldkirch, Austria. He is famous for his work on trigonometry.

1838 Henry Adams born. In his autobiography, *The Education of Henry Adams*, he wrote in the third person: "At best he would never have been a mathematician; at worst he would never have cared to be one; But he needed to read mathematics, like any other universal language, and he never reached the alphabet."

1923 The treasure-laden tomb of Tutankhamen—"King Tut"—was opened by archaeologists. The first radio news also occured on this date.

1982 Sweden issued three stamps picturing impossible figures. Does this twisted triangle have a name? [Scott #1396–8]

1984 In a Dungeons of Doom computer adventure game at the University of Texas at Austin, the Rogue, manipulated by an expert system, descended through the 26 levels of the dungeons, fought off all monsters, seized the Amulet of Yendor, amassed a considerable pile of gold and returned safely to the surface, being the first ever to do so. See *Scientific American*, February 1985, esp. p. 19.

## 17 February

1600 Giordano Bruno burned alive as a heretic. It is a nineteenth century myth that he refused to recant his view that the earth moves. See DSB 2, 542.

1874 Thomas Watson, founder of IBM, born.

1880 Thomas Alva Edison obtained patent #224,665 for an improved model of his mimeograph machine. See 8 August 1876. [Kane, p. 390]

1885 Birthdate of Tadahiko Kubota, who worked on differential geometry.

1890 Ronald Aylmer Fisher, the father of statistics, born in England.

1891 Adolf Abraham Fraenkel born. He did important early work in set theory.

1905 Rózsa Péter born in Budapest. She graduated from Eötvös Loránd University in Budapest in 1927 and was a world-famous logician in the early 1930s, although she did not receive her Ph.D. until 1935, nor a permanent job until 1945. In 1951 she wrote the first monograph on recursive function theory. Only when the teachers college where she taught closed, did she receive a university position. She had many interests outside of mathematics, including cooking, writing film reviews, and translating poetry. In 1954 she wrote a popular book on mathemtics, *Playing with Infinity: Mathematical Explorations and Excursions*, which has been translated into fourteen languages. It is available in English from Dover. For more information see, Louise S. Grinstein and Paul J. Campbell, *Women of Mathematics. A Biobibliographic Sourcebok* (1987), 171–174.

## 18 February

3102 B.C. The Kaliyuga begins according to the Indian mathematician Āryabhaṭa (born A.D. 476). He believed all astronomical phenomena were periodic, with period $4,320,000 = 20 \times 60^3$ years, and that all the planets had mean longitude zero on this date. [*College Mathematics Journal*, 16 (1985), p. 169.]

1404 Leone Battista Alberti born. This noted architect took up the study of mathematics for relaxation. He contributed to the study of perspective. [DSB 1, 96]

1670 "Joannes Georgius Pelshower [Regimontanus Borussus] giving me a visit, and desiring an example of the like, I did that night propose to myself in the dark without help to my memory a number in 53 places: 24681357910111214111315161820171921222426283023252729 31 of which I extracted the square root in 27 places: 157103016871482805817152171 *proximé*; which numbers I did not commit to paper till he gave me another visit, March following, when I did from memory dictate them to him." So wrote John Wallis. [*American Journal of Psychology*, 4(1891), 38]

1851 Carl Gustav Jacobi died, from smallpox, in his 47th year. [Thanks to Howard Eves]

1879 "I will do the same for the young women that I do for the young men. I shall take pleasure in giving gratuitous instruction to any person whom I find competent to receive it. I give no elementary instruction, but only in the higher mathematics." Benjamin Peirce to Arthur V. Gilman, president of Harvard. [*Scripta Mathematica*, 11(1945), 259]

1879 J. J. Sylvester, in a lecture at the Peabody Institute in Baltimore, read "Rosalind", a mock-sentimental poem of four hundred lines all ending in "ind". For the first few lines of this dreadful

poem, see *Osiris*, 1(1936), p. 106.

1930 Clyde Tombaugh (1906–1997) discovered Pluto on photographic plates. For 45 minutes, before he showed his superiors, he was the only person in the world who knew it existed. When he later went to college he was not allowed to take Astronomy I, the instructor thinking it unsuitable for the discoverer of a planet.

1966 Eulogy for JOHNNIAC delivered.

## 19 February

1473 Nicolaus Copernicus, Polish astronomer, born. His theory that our Sun is at the center of our Solar System and that the Earth and other planets revolve around it, was greeted by his contemporaries with skepticism. Today it has been so thoroughly assimilated into our culture, that no schoolchild would doubt it today.

1512 Niccolo Tartaglia, age 12, was seriously wounded during the sack of Brescia. The wound caused a stutter, and this gave him his nickname Tartaglia, the stutterer. [Dedron, p. 207]

1549 Osiander wrote of Michael Stifel: "He has devised new numbers for the alphabet, namely the triangular numbers, and his fantasies are more absurd than before." See DSB 13, 61.

1671/72 Newton's first publication appears as a letter in the *Philosophical Transactions*. It deals with his new theory of light, showing that a prism separates white light into its component colors. Huygens, Hooke and others objected so strongly that he vowed not to publish again. Fortunately that vow was not kept.

1876 Sylvester began his duties at the newly founded Johns Hopkins. [*Osiris* 1(1936), p. 88]

1878 Phonograph patented.

1883 Axel Thue born.

1897 Karl Weierstrass died peacefully at the age of 82 at his home in Berlin after a long illness culminating in influenz. It is reported that his last wish was that teh priest say nothing in his praise at the funeral, but to restrict the services to the customary prayers. [Thanks to Howard Eves]

1940 Otto Toeplitz died in Jerusalem, after having left Germany in the Spring of 1939. He made lasting contributions to the theory of integral equations and the theory of functions of infinitely many variables. Today he is best remembered for two popular works which have been translated into English: *The Enjoyment of Mathematics* (original 1930, 1957), and *The Calculus: A Genetic Approach* (first published 1949; English 1963). These are some of the most successful attempts to bring higher mathematics to the general public. The later shows his deep interest in the history of mathematics; every calculus teacher could profit from reading it.

1972 The *New Yorker* published an article by A. Adler on "Mathematics and Creativity" that was not well received by the mathematical community. See *The [old] Mathematical Intelligencer*, no. 2.

## 20 February

1844 Ludwig Bolzmann born.

1930 Kenneth Olsen, founder of Digital Equipment Company, was born. He began the company with $40,000.

1962 John Glenn is the first American to orbit the Earth. He orbited three times in his Mercury capsule in 4 hours and 55 minutes (5 h. 17 m. ?), with an average speed of 17,400 miles per hour. (The first space flight was Soviet.) [Navy Facts, 15, 204]

1966 The only verified example of a family producing five single children with coincidental birthdays is that of Catherine (1952), Coral (1953), Charles (1956), Claudia (1961), and Cecelia (1966), born to Ralph and Carolyn Cummins of Clintwood, VA. What is the probability of this happening?

1979 The German Democratic Republic issued a stamp commemorating the centenary of Einstein's birth. It shows the Einstein tower in Potsdam and his famous formula $E = mc^2$. [Scott #1990]

## 21 February

—— Latest possible date for the beginning of the Chinese Lunar New Year.

1591 Girard Desargues born. He did noted work in projective geometry.

1699 Newton elected the second foreign member of the French Academy. See January 28, 1699. [*American Journal of Physics*, 34(1966), 22]

1727/8 Isaac Greenwood began his "Publick" lectures at Harvard as the first Hollis Professor of Mathematics and Natural Philosophy. The lectures were open to the entire university. [I. B. Cohen, *Some Early Tools of American Science*, p. 35.]

1908 Birthdate of Dr. Irving Joshua Matrix, the greatest numerologist who ever lived. At the age of seven he astonished his minister Father when he pointed out that 8 is the holiest number of all: "The other numbers with holes are 0, 6, and 9, and sometimes 4, but 8 has *two* holes, therefore it is the holiest." Martin Gardner first drew attention to Dr. Matrix in his January 1960 column "Mathematical Games," in *Scientific American*. For more details, see *The Incredible Dr. Matrix*, by Martin Gardner [p. 3-4].

## 22 February

1630 Popcorn was introduced to the English colonists at their first Thanksgiving dinner on this date by Quadequina, brother of Massasoit. As his contribution to the dinner he offered a deerskin bag containing several bushels of "popped" corn. [Kane, p. 481]

1796 Adolphe Quetelet born. He made important early contributions to statistics, including the introduction of the concept of the "Common man."

1856 Micaiah John Muller Hill born. He worked in hydrodynamics, on the three-body problem, and has a differential equation named after him.

1877 J. J. Sylvester, at a commencement address at Johns Hopkins, gave his view on the relation between teaching and research: "An eloquent mathematician must, from the nature of things, ever remain as rare a phenomenon as a talking fish, and it is certain that the more anyone gives himself up to the study of oratorial effect, the less he will find himself in a fit state of mind to mathematicize." See Midonick, *The Treasury of Mathematics*, p. 768.

1880 American Poet Sidney Lanier (1842–1922) read his "Ode to The Johns Hopkins University", which indicated the original faculty was "Led by the soaring-genius'd Sylvester." [*Osiris*, 1(1936), p. 112]

1903 Frank Plumpton Ramsey born.

1926 At its fiftieth anniversary celebration, Johns Hopkins University awarded a long overdue doctorate to Christine Ladd-Franklin. Now a sprightly 79, she attended the ceremonies to collect her degree 44 years late. [*New York Times*, 23 February 1926, p. 12. Thanks to Judy Green. Also see Rossiter, *Women Scientists in America*, p. 46.]

1965 Rwanda, in central Africa, issued a series of stamps honoring the National University of Rwanda at Butare. Included in the picture is a radical sign, in fact, $\sqrt[4]{}$. This is the only stamp which includes a radical sign, a symbol which originated in Germany. For the complicated history of this symbol, see Cajori, *A History of Mathematical Notations*, §§324–338. [Scott #84, 88]

## 23 February

1468 Johannes Gutenberg, printer, died.

1826 Lobachevsky first announced his principles of non-Euclidean geometry. This was done in a talk at his home University of Kazan. Unfortunately no record of the talk survives.

1855 At 1:05 a.m., Johann Carl Friedrich Gauss, Professor of Mathematics and Director of the Observatory at Göttingen, ceased breathing. His pocket watch, which he had carried with him most of his life, ceased ticking at almost exactly the same time. [Eves, *Adieu*, 43°]

1955 Germany issued a stamp for the centenary of the death of Gauss. [Scott #725]

## 24 February

1582 Pope Gregory XIII promulgated his calendar reform in the papal bull *Inter gravissimus* (Of the gravest concern). It took effect October 5, 1582.

1755 William Hogarth's satirical print, "An Election Entertainment," was published. It containes a Tory sign bearing the inscription "Give us our eleven days." This refers to the fact that eleven dates were removed from the calendar when England converted to the Gregorian calendar on September 14, 1752. See *Hogarth's England* by Eveline Cruikshank, p. 33, for the print.

1772 Lagrange, in a letter to d'Alembert, called higher mathematics "decadent." [Grabiner, *Origins of Cauchy's Rigorous Calculus*, pp. 25, 185]

1842 Sylvester resigned his position at the University of Virginia (after only four months), after a dispute with a student who was reading a newspaper in class. Persistent rumors that he killed the student are unfounded. See *Osiris* 1(1936), p. 100.

1856 Death of Nikolai Ivonovich Lobachevsky, at age 62.

1878 Felix Bernstein born. In 1895 or 1896, while still a Gymnasium student, he volunteered to read the proofs of a paper of Georg Cantor on set theory. In the process of doing this the idea came to him one morning while shaving of how to prove what is now called the Cantor/Bernstein theorem: If each of two sets is equivalent to a subset of the other, then they are equivalent. [DSB 2, 58]

1881 Cambridge University in England allowed women to officially take university examinations and to have their names posted along with those of the male students. Previously some women were given special permission to take the Tripos Exam. One of these was Charlotte Agnes Scott, who did quite well on the exam. At the award ceremony "The man read out the names and when he came to 'eithth,' before he could say the name, all the undergraduates called out 'Scott of Girton,' and cheered tremendously, shouting her name over and over again with tremendous cheers and wavings of hats." [*Women of Mathematics. A Biobibliographic Sourcebook* (1987), edited by Louise S. Grinstein and Paul J. Campbell, 194-195]

1920 As part of the National Education Association's annual meeting, 127 mathematics teachers from 20 states met in Cleveland, Ohio, for the "purpose of organizing a National Council of Mathematics Teachers."

1968 Jocelyne Belle discovers first pulsar.

## 25 February

1709 G. Riccati born.

1732 Christopher Wren died. He is buried in St. Paul's Cathedral in London which he redesigned and rebuilt after the fire of 2 February 1766. His tomb contains the fitting epitaph, *Si monumentum requiris, circumspice* (If you seek a monument, look about you). [Eves, *Circles*, 232°]

1870 Hermann Amandus Schwarz sent his friend Georg Cantor a letter containing the first rigorous proof of the theorem that if the derivative of a function vanishes then the function is constant. See H. Meschkowski, *Ways of Thought of Great Mathematicians*, pp. 87–89 for an English translation of the letter.

1976 The Soviet Union issued a stamp picturing the mathematician Anton Davidoglu (1876–1958). [Scott #2613]

## 26 February

1616 Galileo is ordered to abandon Copernicanism.

1786 Dominique Françoise Jean Arago born at Estagel on the France-Spain border. He worked in optics, astronomy, and geophysics. As *Secrétaire Perpétuel* of the *Académie* he wrote anecdote filled obituaries for Ampère, Carnot, Fourier, Fresnel, Laplace, Malus, and Poisson. [Grattan-Guinness, 1990, pp. 356 and 1372]

1882 Wedderburn born.

1885 "The Burroughs Company brought out the first adding machine and announced that it would sell for $27.75 plus $1.39 shipping charges, for a total of whatever that came to." [*366 Dumb Days in History* by Tom Koch]

1962 A new teaching method based on "how and why things happen in mathematics rather than on traditional memorization of rules" is announced by the Educational Research Council of Greater Cleveland. This became the Cleveland Program of the New Math.

## 27 February

1477 Founding of the University of Upsala. [Müller]

1881 Birthdate of Luitzen Egbertus Jan Brouwer, the father of intuitionism, a philosophy of mathematics starting with primordal intuition and which denies the law of the excluded middle. [DSB, 2, 512]

1890 Dedekind's letter to Keferstein.

1936 France issued a stamp with a portrait (by Louis Boilly) of André-Marie Ampère (1775–1836) to honor the centenary of his death. [Scott #306]

1989 In a review of Einstein–Bessso correspondence in the *New Yorker*, Jeremy Bernstein wrote: "In 1909, Einstein accepted a job as an associate professor at the University of Zurich, ...   Einstein makes a familiar academic complaint—that because of his teaching duties he has less free time than when he was examining patents for eight hours a day."

## 28 February

1552 Jobst Bürgi born. He did some of the earliest work on logarithms.

1678 In a letter to Robert Boyle, Isaac Newton explained his concept of ether. "I suppose that there is diffused through all places an ethereal substance capable of contraction and dilation, strongly elastic and, in a word, much like air in all respects, but far more subtil." [Rigaud, *Letters of Scientific men*, vol. 2, p. 407; Thanks to David Kullman]

1735 A. Vandermonde born. He is best remembered today for a determinant that is named after him.

1825 Cauchy presented to the *Académie* a paper on integals of complex-valued functions where the limits of integration were allowed to be complex. Previously, he had done much work on such integrals when the limits were real. [Grattan-Guinness, 1990, p. 766]

1859 Birthdate of Florian Cajori, historian of mathematics.

1878 Pierre Joseph Louis Fatou born in Lorient, France. Although he earned his living as an astronomer, he contributed an important lemma concerning the Lebesgue integral. [DSB 4, 547].

1956 A patent is issued to Jay Forrester for core memory for computers.

## 29 February

—— Leap day is also called "bissextile" or "second sixth." Under the Julian Calendar the leap day was added just before February 25, more specifically "ante diem sexto Kalendas Martius" (sixth day before the Calends of March) and was called "bissexto Kalendas Martius" (the second-six of the Calends of March). [*Scientific American*]

1860 Herman Hollerith born.

1924 The first Josiah Willard Gibbs lecture was delivered by Professor M. I. Pupin of Columbia University to an AMS meeting in New York City. In introducing him, AMS president Veblen said "It is hoped that the Willard Gibbs Lecturers will remind the mathematicians of something that we fear they sometimes forget, – the existence of an outside world. It is equally hoped that they will remind the outside world that mathematics is a growing concern, – not a pedantic exercise for the torment of schoolboys, but a living organism growing larger and stronger each year." See *BAMS* 30(1924), p. 289.

1968 British astronomer, Jocelyn Burnell, announced the discovery of a pulsar, a pulsating radio source believed to be a rapidly rotating neutron star.

1984 Since North America fully adopted the Gregorian Calendar in 1752, which leap years were square numbers and had Februarys with five Wednesdays (like 1984)? [Rev. Ron Chrisley, Mt. Sterling, Ohio]

1984 Lee Temby, who was born on this date 32 years ago, gave birth to a son, William. The probability of this happening is 2,134,521 to 1. Explain.

2000 This is a leap year. In the Gregorian calendar every year divisible by four is a leap year, unless the year is divisible by 100, unless it is divisible by 400.

# MARCH

## 1 March

**1829** Evariste Galois published his first paper. It dealt with continued fractions. [Thanks to Howard Eves]

**1847** Lamé presented a proof of Fermat's last theorem to the French Academy. The error was later pointed out by Liouville and by Kummer. The "theorem" remains unproved even today. [DSB 3, 134].

**1862** Peter Barlow died. His *New Mathematical Tables* (1814) later known as *Barlow's Tables*, gave the factors, squares, cubes, square roots, reciprocals, and natural logarithms of all numbers from 1 to 10,000. It was so accurate that it was reprinted numerous times, the last being 1947. [DSB 1, 459]

**1896** Henri Becquerel discovers radioactivity. In 1903, together with the Curies, he received the Nobel Prize in Physics for this work. See 7 March 322 B.C.

**1911** Closing date for a prize of $5000 by King Leopold of Belgium for the best work to "Describe the progress of aerial navigation and the best means to encourage it." [BAMS 15, 469]

**1928** Seymour Papert born. He invented LOGO, a programming language designed especially for children.

**1984** The Vatican newspaper, *L'Observatore Romano*, stated, "The so-called heresy of Galileo does not seem to have any foundation, neither theologically nor under canon law."

## 2 March

—— This is a most interesting mathematical date for nothing of mathematical interest seems to have occurred on this date. However, counterexamples are expected.

## 3 March

**1838** Giorge William Hill born in New York City. In 1903 he was ranked second, after E. H. Moore, by the leading mathematicians in the U.S. in Catell's *American Men of Science*. [DSB 6, 398]

**1845** Georg Cantor born. His early research, dealing with the convergence of trigonometric series, led him to create a whole new field of mathematics. He called it Mengenlehre; we call it Set Therory.

**1847** Alexander Graham Bell born in Scotland. This great American inventor was, by profession, a teacher of the deaf.

**1898** Emil Artin born. He solved Hilbert's seventeenth problem in 1927. See DSB 1, 307.

**1916** Paul Halmos born in Hungary. If you want to know more about this interesting individual and his mathematical career, read his book *I Want to Be a Mathematician. An Automathography* (1985).

## 4 March

—— This date issues a command: March forth!

**1675** John Flamsteed appointed as the first astronomer royal at the newly founded Greenwich Observatory by King Charles II. [A. Helleman and B. Bunch, *The Timetables of Science*, p. 160].

**1801** Thomas Jefferson became the third president of the United States. During his two terms in office he repeatedly sponsored bills providing governmental support of science for the common good. See DSB 7, 89.

**1822** Jules Antoine Lissajous born in Versailles, France. In 1855 he developed a method for studying vibrations due to sound by using a mirror to project an image of the vibrations on a screen. Lissajous curves are generated by the parametric equations

$$x = a\sin(\omega_1 t + q_1) \quad y = b\sin(\omega_2 t + q_2)$$

where $\omega_1$ and $\omega_2$ are small integers. The curves are easily produced on an oscilloscope or a computer. [DSB 8, 398]

1979 Voyager I photo reveals rings of Jupiter. See March 10, 1977.

## 5 March

1512 Birthdate of Gerard Mercator, Flemish geographer, mapmaker and mathematician. The Mercator Projection was a great aid to navigation.

1575 William Oughtred born. His *Clavis mathematicae (Key to Mathematics,* 1631) was, in the words of the historian Florian Cajori "a guide for mountain-climbers, and woe unto him who lacked nerve." It was one of the first books that Newton read and it taught him that algebra was a tool for discovery that did not need to be backed up by geometry.

1625 John Collins born at Wood Eaton, near Oxford. Isaac Barrow dubbed him "Mersennus Anglus" because he was such an efficient correspondent of mathematical news. [DSB 3, 348]

1639 Debeaune to Mersenne: "I do not think that one could acquire any solid knowledge of nature in physics without geometry, and the best of geometry consists of analysis, of such kind that without the latter it is quite imperfect." [DSB 3, 616]

1827 Laplace died. His last words were, "What we know is very slight; what we don't know is immense." [Eves, *Revisited*, 319°]

1842 Heinrich Weber born in Heidelberg. He worked in analysis and number theory, was cofounder of the Deutsche Mathematiker-Vereinigung, edited the works of Riemann (1876) with his closest friend Dedekind, and had two very famous students: Hermann Minkowski and David Hilbert. [DSB 14, 202]

1876 Sylvester, at age 61, appointed professor of mathematics at Johns Hopkins University. This was the real beginning of graduate mathematics education in the United States. [*Science*, 64(1926), p. 576.]

1885 Pauline Sperry born in Peabody, Massachusetts. After graduating Phi Beta Kappa from Smith College in 1906 she taught several years before doing graduate work at the University of Chicago under the projective differential geometer Ernest Julius Wilczynski (1876–1932). After receiving her Ph.D. in 1916 she taught at the University of California at Berkeley, becoming the first woman to be promoted to assistant professor in mathematics (in 1923). In 1950 she was fired for refusing to sign a loyalty oath. See 17 October 1952.

1915 Laurent Schwartz born in Paris. In 1950 he won a Fields Medal for developing the theory of distributions, a new notion of generalized functions motivated by the Dirac delta-function of theoretical physics.

1954 Julian Lowell Coolidge died. This geometer wrote several noteworthy books on the history of geometry. [DSB 3, 399]

## 6 March

1805 Legendre introduced least squares. Gauss had them ten years earlier but had not published, so some controversy ensued. [Springer's 1985 Statistics Calendar] Need to cite recent paper in HM on the controversy.

1832 Gauss responds to his "old, unforgettable friend," Farkas (Wolfgang) Bolyai, that he has been working on non-Euclidean geometry "in part already for 30–35 years." In the same letter Gauss points out several flaws in Euclid. See Big Kline, p. 1006.

1866 Birthdate of Ettore Bortolotti, historian of mathematics. He revealed the importance of Evangelista Torricelli's infinitesimal results and vindicated Cataldi's claim to the discovery of continued fractions. [DSB, 2, 320].

1967 A study of twelve industrial nations revealed that mathematics achievement is highest in Japan, lowest in the U.S.

## 7 March

322 B.C. Aristotle died, age 62. He was the first great logician (only Frege and Gödel are of equal rank),

codifing the theory of syllogistic. His contributions to science were influential for centuries. One of my teachers at Notre Dame, R. Catesby Taliaferro, translator of Apollonius (Great Books edition), once commented that Aristotle's greatest contribution to science was that he delayed the invention of the atomic bomb by five hundred years. [To appreciate the irony of this statement you must know that Aristotle did much to retard science.]

1792 Sir John Herschel, English astronomer, born.

1816 Olbers tried, without success, to entice Gauss into the competition set by the Paris Academy seeking a proof or disproof of Fermat's Last Theorem. [Thanks to Howard Eves]

1918 Jan Lukasiewicz in his "Farewell Lecture" as Rector of Warsaw University announces the work on three-valued logic which he had worked out the summer before. [*Selected Works*, 84–86.] His parenthesis-free notation was discovered in 1924 and first used in print in 1929 [Ibid., p. 180]. Today this "Reverse Polish Notation" is widely used. See *Hewlett-Packard Personal Computer Digest*, vol.7 (1980). See January 13, 1911.

1989 In a review of *Profscam: Professors and the Demise of Higher Education* by Charles J. Sykes in *The Los Angeles Times*, the reviewer wrote that this is how Sykes would word an advertisement at a big research university: "WANTED: University professor. Good salary. Little work. Lots of prestige. Possible lifetime security. Not much contact with students. Plenty of time to research your obscure interests. Good chance for government grants and corporate consulting." [*CMJ*, 21:1 (January 1990), p. 44]

## 8 March

1851 George Chrystal born in Aberdeenshire, Scotland. In 1886 he published the influential textbook *Algebra*, with "clear, rigorous, and original treatment of such topics as inequalities, limits, converergence." [DSB 3, 265]

1900 Howard Aiken born.

## 9 March

1451 Birthdate of Amerigo Vespucci, Italian navigator, who claimed to have reached North and South America in 1498. It is after him that the continents are named.

1497 Copernicus, then a student of canon law at the University of Bologna, made his first recorded astronomical observation. [DSB 3, 401]

1824 Birthdate of Leland Stanford, the American railroad builder and capitalist who founded Stanford University in 1885.

1832 Wolfgang Bolyai made a corresponding member of the mathematics section of the Magyar Academy. [Bonola, *Non-Euclidean Geometry*, Appendix 1, p. xxv]

## 10 March

1615 Henry Briggs was completely engaged in the study of logarithms by this date for he wrote "Neper, lord of Markinston, hath set my head and hands a work with his new and admirable logarithms. I hope to see him this summer, if it please God, for I never saw a book, which pleased me better, and made me more wonder." [DSB 2, 462]

1748 Birthdate of the Scottish physicist and mathematician John Playfair. He is responsible for introducing (although we now know that it was known to Proclus in the fifth century) the commonly used equivalent of Euclid's Fifth Postulate: Through a given point not on a given straight line only one line parallel to the given line may be drawn.

1773 Laplace introduces inverse probability. [Springer's 1985 Statistics Calendar]

1797 The surveyor Caspar Wessel presented his one and only mathematics paper to the Danish Academy of Sciences. It established his priority in publishing a geometrical representation of complex numbers. The paper was essentially unknown until 1895 when Christian Juel pointed out its significance. See DSB for more details about his methods.

1812 Jean Jacques Bret became docteur dés sciences, having previously been professor of transcendental mathematics at the lycée in Grenoble. Later he was involved in a prolonged polemic

with J. B. E. Dubourguet concerning the fundamental theorem of algebra. [DSB, 2, 444]

1864 William Fogg Osgood born. After earning a Ph.D. under Klein at Erlangen in 1900 he joined the Harvard faculty, where he taught for forty-three years. He disagreed with his colleague E. V. Huntington, on the basis of dimension, that mass and $W/g$ (weight divided by gravity) are equal. To stress his point, Osgood sent Huntington a card reading "Merry $X$–$W/g$."

1876 Alexander Graham Bell received patent number 174,465—the most valuable patent ever issued. Naturally it was for the telephone. Bell's first complete sentence over the telephone was: "Mr. Watson, come here; I want you." Exactly a century later the U.S. issued a postage stamp commemorating this event. [DSB 1, 583, Scott #1683]

1977 Rings of Uranus discovered. See March 4, 1979.

1981 Czechoslovakia issued a stamp picturing the philosopher/mathematician Bernhard Bolzano (1781–1848). [Scott #2352]

## 11 March

1574 By means of an equinoctial armillary which he constructed on the façade of the church of Santa Maria Novella, Egnatio Danti observed that the vernal equinox occurred eleven days earlier than it should have according to the Julian Calendar. This is one of the many events which led to the Gregorian calendar reform of 1584. [DSB 3, 558]

1582 At noon the sun shone in through the mouth of the South Wind, a mural on one wall, and crossed the meridional sundial line in the Meridian Room in the Tower of Winds in Rome. This should have happened on March 21, so Pope Gregory VIII was (supposedly) convinced of the need for calendar reform. See *Sky and Telescope*, 64(1982), 530–533.

1711 Robert Simson, who had no formal training in mathematics, was elected to the chair of mathematics at the University of Glasgow on the condition that "he give satisfactory proof of his skill in mathematics previous to his admission." [DSB, 12, 446].

1780 Birthdate of August Leopold Crelle. Although always interested in mathematics he lacked the money to enroll at a university and so became an engineer instead. In 1826, when he had the money, he founded the *Journal für die rein und angewandte Mathematik* and edited fifty two volumes. Although not a great mathematician he had a gift for recognizing the abilities of such men as Abel, Jacobi, Steiner, Dirichlet, Plücker, Möbius, Eisenstein, Kummer, and Weierstrass and offered to publish their papers in his journal, which, to this day, is known as *Crelle's Journal*. [DSB 3, 466]

1794 At the instigation of Monge the École Polytechnique was founded. [DSB 7, 569]

1822 Birthdate of Joseph Louis Françoise Bertrand, who at age 11 started to attend classes at the École Polytechnique, where his Uncle Duhamel was a well-known professor of mathematics. At 17 he received his doctor of science degree. [DSB 2, 87].

1890 Birthdate of Vannevar Bush, the electrical engineer who developed the differential analyzer in the 1930s. This was an analogue device for integrating second order differential equations. It provides a nice simple model of the definite integral.

## 12 March

1824 Gustav Robert Kirchhoff, German physicist, born.

1835 Simon Newcome was born in Wallace, Nova Scotia, Canada. This astonomer and mathematician was the most honored scientist of his time.

1859 Birthdate of Ernesto Cesàro, whose more than 250 publications range over much of mathematics.

1926 John von Neumann, 22, received his doctorate *summa cum laude* in mathematics with minors in experimental physics and chemistry from the University of Budapest. [Goldstein, *The Computer form Pascal to von Neumann*, p. 170]

## 13 March

1639 Harvard University named after its London born clergyman founder John Harvard (born 1607). See October 28, 1636.

1641 Vincenzo Renieri wrote to Galileo describing certain experiments on falling bodies. "Thus Vincenzo Viviani's account of the results of Galileo's experiments that involved dropping different weights from the top of the bell tower of Pisa seems to be completely unfounded." [DSB 3, 3]

1758 Halley's comet in perihelion, as he predicted in 1682.

1781 Sir William Herschel discovered Uranus at 10:30 PM.

1830 The oldest surviving example of a typewritten letter was sent by inventor William Burt to his wife. It is displayed at the Smithsonian.

1852 Uncle Sam, the familiar red, white, and blue garbed symbol of the United States, made his debut as a cartoon character in the *New York Lantern.*

1884 Standard time was adopted throughout the United States.

1925 A law went into effect in Tennessee prohibiting the teaching of Darwin's theory of evolution.

1990 The temperature in New York City hit 85°, breaking the old record set in 1929 by 15°. Did you know that breaking records is related to the harmonic series? See the *UMAP Journal*, ?????? [*New York Times*, 14 March 1990, p. B1]

1998 Friday-the-thirteenth. There was also a Friday-the-thirteenth in the previous month. The last time that February and March both had Friday-the-thirteenths was in 1987. When will the next time be?

## 14 March

1664 Isaac Barrow delivered his "Prefatory Oration" as the first Lucasion Professor at Cambridge. It lasted two hours, and contained the following plea for students to come to his office: "If it be then your Pleasure, ye Lovers of Study, come always; be not restrained through any Fear, or retarded too much by Modesty, what you may do by your Right, you shall make me do willingly, nay gladly and joyfully. Ask your Questions, make your Enquiries, bid and command; you shall neither find me adverse nor refractory to your Commands, but officious and obedient. If you meet with any Obstacles or Difficulties, or are retarded with any Doubts while you are walking in the cumbersome Road of this Study of *Mathematics*, I beg you to impart them, and I shall endeavor to remove every Hindrance out of your Way to the best of my Knowledge and Ability." [*Isis*, 19(1933), p. 127]

1667/8 Pepys records in his diary that he saw Sir. Samuel Morland's adding machine for pounds, shillings and pence.

1829 Carl Gustav Jacobi exclaimed ecstatically over a famous paper of Niels Henrik Abel. [Thanks to Howard Eves]

1879 Albert Einstein born. One of the towering figures of twentieth-century physics, although he showed no early signs of genius. In 1905, as a 26-year-old clerk in the Swiss patent office, he published his Special Theory of Relativity. Although many today consider him a talented mathematician, his abilities in our field were quite limited, and he often turned to others for assistance.

1882 Wacław Sierpiński born. He made important contributions to function theory and set theory, but now that fractals are all the rage, he is famous for the space which bears his name.

1883 Karl Marx died (born 5 May 1818). The foundations of the differential calculus was one of his interests. [DSB and HM 4, 303–313]

1900 U.S. adopted gold standard.

1934 France issued a stamp for the centenary of the death of Joseph Jacquard (1752–1834), inventor of an improved loom for figured weaving. The punched cards that he invented provided the model for computer cards. [Scott #295]

1951 Kurt Gödel shared the first Einstein award with Julian Schwinger. [Dawson]

1962 Norway issued a pair of stamps commemorating the centenary of the birth of Vilhelm Bjerknes (1862–1951), physicist, meterologist, and mathematician. [Scott #403–4]

1973 Howard Aiken died. In 1939 at Harvard he began work on the world's first operational elec-

tromechanical computer, the MARK I.

## 15 March

44 B.C. Julius Caesar assassinated on the Ides of March, a phrase which came to denote an ill omen. The word "ides" is from the Etruscan for one-half (it is the middle of the lunar month).

1570 Birthdate of the astronomer Andrea Argoli. From 1622 to 1627 he held a chair of mathematics in Rome, but lost it because of his enthusiasm for astrology. [DSB 1, 244]

1868 Grace Chisholm Young born at Haslemere (near London). She attended Girton College Cambridge and did graduate work with Felix Klein in Germany. In 1895 she became the first woman to receive a doctorate in any field in Germany. The next year she married William Henry Young and they wrote many joint papers in function theory. Their *The Theory of Sets of Points* (1906) was the first book published in set theory. For more information see pp. 247–254 of *Women of Mathematics. A Biobibliographic Sourcebook* edited by Lousie S. Grinstein and Paul J. Campbell.

1897 James Joseph Sylvester died, at age 83, after earlier suffering a paralytic stroke while working at his mathematics. [Thanks to Howard Eves]

1955 John von Neumann sworn in as one of the first Atomic Energy Commissioners. In August he learned that he had bone cancer. [Goldstein, *The Computer from Pascal to von Neumann*, p. 277]

—— Buzzards return to Hinckley, Ohio.

## 16 March

1713? Saunderson to Jones: "There has been nothing published here since my last to you, excepting a treatise, which is not worth mentioning, by one Mr. Green, fellow of Clare Hall of this university. If there had been anything in it instructive or diverting I should have sent it to you; but I can find nothing in it but ill manners and elaborate nonsense from one end to the other. The gentleman has been reputed mad for these two years last past, but never gave the world such ample testimony of it before." [Rigaud, *Correspondence of Scientific Men of the Seventeenth Century*, I, *263]

1787 George Simon Ohm, German physicist, born.

1802 The United States Military Academy at West Point established by act of congress. This school was the first engineering school in the U.S. Charles Davies, a noted textbook writer, taught there.

1821 Heinrich Eduard Heine born. Undergraduates know him best for the Heine-Borel Theorem. Stated their way it says than a compact city can be guarded by a finite number of arbitrarily nearsighted policemen.

1830 The New York Stock Exchange had its slowest trading day, only 31 shares trading hands.

1846 Magnus Gustaf Mittag-Leffler born. On his seventieth birthday in 1916, Mittag-Leffler and his wife signed their last will and testament. They gave their entire fortune to found a Mathematical Institute which now bears their names. It is in their villa in Djursholm, near Stockholm, Sweden. A sumptuous volume giving a complete calatogue of Mittag-Leffler's library was also published at this time, and this library is now housed in the Institute. Naturally it is a favorite haunt of historians of mathematics. [AMM 23(1916), 185 & 287]

1915 Kunihiko Kodaira born in Tokyo. In 1954 he received a Fields Medal for his work on harmonic integrals and albegraic varieties.

1926 Clark University Physics Professor, Robert H. Goddard, conducted the first successful open-air test of a liquid-fuel rocket. "The rocket soared only forty-one feet, hardly the 'extreme altitudes' Goddard had envisioned, yet the occasion was anologous to the first flight of the Wright brothers at Kitty Hawk nearly a quarter of a century earlier." [William A. Koelsch, *Clark University, 1887–1987*, p. 144]

1986 The *Manchester Guardian Weekly* announces that Colin Rourke of Warwick and his student

Eduardo Rego of Oporto University in Portugal have solved the 82 year old Poincaré conjecture which states that loops on spheres in $n$-dimensions can be shrunk to points. Obviously, Mr. Rego will get his Ph.D. [Wasn't the proof wrong? Need reference.]

## 17 March

—— St. Patrick's Day. The equation of the day is the four-leaved rose $r = \sin(2\theta)$. Work on this curve was first published by the Italian priest Guido Grandi in 1723.

1694 L'Hospital hires his former tutor Johann Bernoulli to "work on what I shall ask you … and also to communicate to me your discoveries, with the request not to mention them to others." The first calculus text resulted in 1696. It contained the famous "L'Hospital's rule," which, we now know, is the work of Bernoulli. [Eves, *Circles*, 208°]

1856 Joseph Lacomme, a French well-sinker, who was taught a curious system of computation by the commissioner of police in Paris, received a silver medal from the French Académie for his discovery of the true ratio of diameter to circumfrence of a circle. This is just one of many bizarre stories about circle squarers told in Augustus DeMorgan's *A Budget of Paradoxes* (1872) [vol. 1,p. 47].

1941 The National Gallery of Art opened its doors on the mall in Washington D.C. The gallery was a gift of Pittsburgh financier Andrew W. Mellon. His personal collection of 152 masterpieces has grown to 80,000 priceless works today. Today it is a good place to see some mathematics, from the lack of perspective in its medieval works, to *The Lady in the Red Hat* with its camera obscura technique, to the geometric starkness of the East Wing.

## 18 March

1602 Birthdate of Jacques de Billy, a Jesuit who taught theology or mathematics, depending on which was needed at the time. At the Collège de Dijon he taught privately Jacques Ozanam, in whom he instilled a love of the calculus. [DSB 2, 131]

1640 Philippe de La Hire born in Paris, France.

1690 Birthdate of Christian Goldbach, a German mathematician who rose to Russian minister of state. He was especially interested in number theory. In a letter to Euler in 1742, he posed the question that we know today as the Goldbach Conjecture: Every even integer greater than two is the sum of two primes. The conjectur is still an open problem in mathematics. [Thanks to Howard Eves]

1796 The noted geometer Jakob Steiner born in Utzendorf, Bern, Switzerland.

1871 Augustus DeMorgan died. To find the year of his birth solve his problem: "I was $x$ years old in the year $x^2$."

1886 Stanisław Leśniewski born.

1990 The *Mathematische Gesellschaft*, the world's oldest existing mathematical society (founded 1690) began a seven day meeting in Hamburg to celebrate its third centenary. [*AWM Newsletter*, vol. 19, no. 2, p. 7]

## 19 March

1791 Report made to the Paris Academy of Sciences advocating the metric system, including the decimal subdivision of the circle. The committee consisted of J. C. Borda, J. Lagrange, P. S. Laplace, G. Monge, and de Condorcet. [Cajori, *History of Mathematics* 266] See April 14, 1790.

1797 The date of the entry in Gauss's scientific diary showing that he had already discovered the double periodicity of certain elliptic functions. [Thanks to Howard Eves]

1892 E. Hastings Moore, of Northwestern University, was elected professor of mathematics by the Board of Trustees of the new University of Chicago. [T. W. Goodspeed, *The Story of the University of Chicago, 1890–1925*, p. 83]

1918 Daylight Savings Time began, New York City.

1937 John von Neumann gave a popular lecture at Princeton on the game of poker. Game Theory

became one of his substantial contributions to mathematics. [A. Hodges, *Alan Turing. The Enigma*, p. 550]

## 20 March

1726/7 o.s.  Newton died intestate. Immediately his relatives began to quarrel over the division of his estate, which amounted to a considerable fortune. Thomas Pellet examined Newton's manuscript holdings in hopes of turning a quick profit. His "thick clumsy annotations 'Not fit to be printed,' now seem at once pitiful and ludicrous." See Whiteside, *Newton Works*, I, xvii ff for details.

1916  Albert Einstein submitted his general theory of relativity to *Annalen der Physik*. [A. Hellemans and B. Bunch, *The Timetables of Science*, p 429].

1938  Serge Novikov born in Gorki, USSR. In 1970 he won a Fields Medal for his work in topology. He proved the topological invariance of the Pontrjagin classes of a differential manifold.

1983  Equinox occurs at 11:30 p.m. EST (early on the 21st in Europe).

## 21 March

——  Commonly considered the first day of spring, a tradition dating from the Council of Nicaea in A.D. 325. The most recent year in which this was in fact true in the U.S. was 1979, when the vernal equinox occurred at 12:22 a.m. EST. The next time the vernal equinox will be on March 21 is in 2103 when it will occur at 1:09:04 a.m. EST. This computation uses a tropical year of 365 days, 5 hours, 48 minutes, and 46 seconds. [*Mathematics Magazine*, 55(1982), 46–47]

1543  Copernicus' *De Revolutionibus* published.

1685  Birthdate of Johann Sebastian Bach, German composer. If you don't think he belongs in this calendar, you have not read Hofsteadter's *Gödel, Escher, Bach: An Eternal Golden Braid*.

1768  Jean Baptiste Joseph Fourier born in Auxerre, France. He was the son of a tailor.

1884  George David Birkhoff born. He was the first major American mathematician.

1963  When this date is written in the form 3/21/63, the product of the first two numbers is the third. This happens 212 times each century (but this is the only one recorded in this calendar). See *Journal of Recreational Mathematics*, 2(1969), p. 112 for a solution.

1989  NCTM released its *Curriculum and Evaluation Standards for School Mathematics*, a document intended to change fundamentally the way mathematics is taught.

## 22 March

1457  First book printed.

1818  The last time that Easter fell on this date, the earliest possible. It will not happen again until the year 2285. By definition Easter is the first Sunday after the first full moon on or after the vernal equinox. Since the Roman Catholic Church defined the vernal equinox to be 21 March and uses a tabulated moon, not the real moon, this is a mathematical issue, not an astronomical event.

1868  Robert Andrews Millikan, American physicist, born. He received the Nobel prize in physics in 1923.

## 23 March

1749  Pierre-Simon Laplace born in Beaumont, France.

1775  Patrick Henry delivered his famous speech containing the challenge "Give me liberty or give me death" to the Provisional Convention of Richmond.

1882  Amalie Emmy Noether born in Erlangen Germany. Someone once described her as the daughter of the mathematician Max Noether. To this Edumund Landau replied "Max Noether was the father of Emmy Noether. Emmy is the origin of coordinates in the Noether family." [Eves, *An Introduction to the History of Mathematics*, sixth edition (1990), p. 575]

1963 Thoralf Skolem died. This Norwegian logician was the first to introduce non-standard models of the natural numbers.

## 24 March

1809 Joseph Liouville born in St. Omer, France.

1899 René Louis Baire defended his doctoral thesis on the theory of functions of a real variable. He was influential in introducing transfinite set theory into analysis. See DSB 1, 407.

## 25 March

1539 Tartaglia tells Cardano about his method of solving cubic equations. [DSB 13, 259]

1655 Christiaan Huygens discovers Saturn's moon Titan. [Muller]

1792 D'Alembert wrote: "I would like to see our friend Condorcet, who assuredly has great talent and wisdom, express himself in another manner." Reading Condorcet's mathematical works is a thankless task, for the notation is inconsistent, the expression of ideas often imprecise and obscure, and the proofs labored. Perhaps this helps explain why he is not a well known mathematician. [DSB 3, 384]

1798 Birthdate of Christoph Gudermann.

## 26 March

1619 Descartes reported (to Beekman) his first glimpse of "an entirely new science," which was to become his analytic geometry (published 1637). [DSB 4, 51]

1773 Birthdate of Nathaniel Bowditch who acquired his knowledge of mathematics through self-study while apprenticed to a ship's chandler. He is most noted for his translation of Laplace's *Mécanique céleste*. [DSB 2, 368]

1913 Paul Erdős (pronounced AIR-dish) born in Hungary. A Jew, he left in 1934 and has been traveling ever since. His forte is posing and solving problems. One of his customs is to offer cash prizes for problems he poses. These awards range from \$5 to \$10,000 depending on how difficult he judges them to be. Erdős has written over 1,000 research papers, more than any other mathematician. The previous record was held by Arthur Cayley, who wrote 927. [Gallian, *Contemporary Abstract Algebra*, p 378].

## 27 March

1845 Birthdate of William Konrad Röntgen, German physicist and discoverer of the X-ray in 1865. In 1901 he became the first physicist to receive a Nobel prize.

1857 Karl Pearson, founder of the field of statistics, born in London.

1958 The first national high-school mathematics competition in the U.S. was held. Since 1983 it has been known as the American High School Mathematics Examination (AHSME). [*The College Mathematics Journal*, 16 (1985), p. 331]

1964 *Life* magazine (pp. 80–91) has a long article dealing with Edward O. Thorp's winning strategy for the game of blackjack. It is explained in detail in his book *Beat the Dealer. A Winning Strategy for the Game of Twenty-One* (1962). The book also contains a fascinating chapter on cheating at cards. See 3 April 1964. [*AMM* 72(1965), p. 438].

## 28 March

1749 Pierre Simon, Marquis de Laplace born.

1794 Condorcet committed suicide by poisoning while in jail so that the republican terrorists could not take him to Paris. See Eves, *Circles*, 239°.

1809 Gauss finished work on his *Theoria Motus*. It explains his methods of computing planetary orbits using least squares. [Springer's 1985 Statistics Calendar]

1928 Alexander Grothendieck born in Berlin. In 1966 he won a Fields Medal for his work in algebraic geometry. He introduced the idea of $K$-theory and revolutionized homological algebra.

1959  Germany issued a stamp commemorating the 400$^{\text{th}}$ anniversary of the death of Adam Riese (c. 1492–1559), a renouned teacher of arithmetic. [Scott #799]

1979  An operator error causes the nuclear reactor in Unit 2 at Three Mile Island to malfunction. Some radioactive material escapes into the atmosphere. [A. Hellemans and B. Bunch, *The Timetables of Science*, p 583].

## 29 March

1873  T. Levi-Civita born.

1933  Italy issued the world's first postage stamp portraying Galileo. [Scott #D16]

## 30 March

1796  The eighteen year old Gauss began his scientific diary with his construction of the regular 17-gon. The Greeks had ruler-and-compass constructions for the regular polygons with 3, 4, 5 and 15 sides, and for all others obtainable from these by doubling the number of sides. Here the problem rested until Gauss completely solved it: A regular $n$-gon is constructible iff $n$ is a product of a power of 2 and one or more distinct Fermat primes, i.e., primes of the form $2^{2^n} + 1$. This discovery led Gauss to devote his life to mathematics rather than philology.

1858  Pencil with attached eraser patented. It has benefited generations of mathematics students.

1864  Helen Abbot Merrill born in Llewellyn Park, Orange, New Jersey. She graduated from Wellesley College in 1886, taught school for several years and then returned to teach at Wellesley from 1893 until her retirement in 1932. She studied function theory with Heinrich Maschke at Chicago, descriptive geometry with G. F. Shilling at Göttingen, and function theory with James Pierpont at Yale, where she received her Ph.D. in 1903. She wrote a popular book about mathematics, *Mathematical Excursions* (1933), that has been reprinted by Dover. For more information see pp. 147–151 of *Women of Mathematics. A Biobibliographic Sourcebook* by Louise S. Grinstein and Paul J. Campbell.

1867  The U. S. purchases Alaska from Russia for $7,200,000 in gold. The most prominent American mathematician of the time, Benjamin Peirce, then superintendent of the Coast Survey, played a role in the acquisition by sending out a reconnaissance party whose reports were important aids to proponents of the purchase. See DSB 10, 480.

1892  Stefan Banach born. His doctoral dissertation, which was published in *Fundamenta Mathematicae* in 1922, marks the birth of functional analysis. [DSB 1, 427]

1951  UNIVAC I turned over to Census Bureau.

1985  M.I.T. computer science graduate students Robert W. Baldwin and Alan T. Sherman successfully decode a cipher consisting of a series of numbers separated by commas. They failed to share in the $116,000 prize offered by Decipher Inc. since they misread the contest rules—the contest ended the previous evening. [Burlington Free Press, 5 April 1985.]

## 31 March

1596  French mathematician, natural scientist, and founder of modern philosophy, René Descartes born at La Haye, near Tours.

1739  Birthdate of Étienne Bezout who worked on the theory of algebraic equations, including an incorrect proof that the quintic was solvable by radicals. In the early nineteenth century some of his influential textbooks were translated into English. One translator, John Farrah, used them to teach calculus at Harvard. [DSB 2, 112]

1806  Thomas Kirkman born. This self educated mathematician delighted in versifying problems and devising mnemonics for troublesome formulas—in fact he wrote a whole book on this topic. He is best remembered for a problem he posed in 1850 in the *Lady's and Gentleman's Diary*: Fifteen schoolgirls took daily walks arranged in five rows of three each so that each might have a companion. How can they arrange it so that they can take seven walks without any girl walking with any other girl in a triplet more than once? [DSB 7, 385]

1809 Edward FitzGerald born. In March of 1859 he published his translation of the *Rubáiyát of Omar Khayyám*, one of the most frequently quoted lyric poems. Images such as "A jug of wine, a loaf of bread, and thou" have passed into common currency. It is not so well known that Khayyám was also a mathematician.

1854 The University of Königsberg awarded Weierstrass an honorary doctorate. Previously he was a Gymnasium teacher without a university degree. [DSB 14, 221]

1981 *Time* (p. 51) reported that Educational Testing Service had to change the scores on 250,000 PSAT and 19,000 SAT papers because a student had successfully challenged a mathematical question about polyhedrons with no right answer. *Mathematics Magazine* 54 (1981), pp 152 and 277. See Newsweek 6 April 1981, p 84.

1984 *Science News* reports that Persi Diaconis, a statistician at Stanford, can do a perfect riffle shuffle eight times in a row, thereby returning the 52-card deck to its original order. He has also proved that seven ordinary shuffles is enough to randomize a deck of cards.

# APRIL

## 1 April

1776 Sophie Germain born in Paris. She worked in several areas of mathematics and science, including number theory. She proved Fermat's Last Theorem for exponents less than 100 (the American, Barkley Rosser, has extended this to 41,000,000). In 1816 she won the Prix Bordin for her work on vibrations of elastic plates. Naturally, she was the first woman to win this prize. See *Women of Mathematics. A Biobibliographic Sourcebook* (1987), edited by Louise S. Grinstein and Paul J. Campbell for further details.

1801 Gauss records in his diary that he extended his "purely analytical formula" for Easter to the Passover date. [Dunningham, p. 69]

1826 Combustion engine patented.

1862 Carl V. L. Charlier born.

1876 The *New-England Journal of Education* (vol. 3, p. 161), in its weekly mathematics column, published a proof of the Pythagorean theorem by General James A. Garfield, Member of Congress from Ohio, and later President of the United States. They refer to the theorem as the *pons asinorum*, though today that term is reserved for Euclid I.5 which states that the base angles of an isosceles triangle are equal.

1895 A. C. Aitken born. "He was asked to turn 4/47 into a decimal. After four seconds he answered, giving one digit every three-quarters of a second: 'Point 0851063829787234042553191.4.' He stopped there—after 24 seconds, discussed the matter for a minute, and then started up again. 'Yes, 191489. I can get that.' Five-second pause. '361702127659574468. Now that's the repeating point. It starts again at 085. So, if that's 46 places, I'm right.'" Exercise: Check this calculation on your hand calculator. Quoted from *The Body* by Anthony Smith, NY: Walker & Co., 1968, p. 320.

1939 To commemorate the New York World's Fair the U.S. issued a postage stamp picturing a trylon and perisphere. This was the first stamp in the world to picture geometric objects. Can you identify these shapes? They are not in my dictionaries. [Scott #853]

1947 Alain Connes born in Darguignan, France. In 1982 he received a Fields Medal for his work in operator theory. See *International Mathematical Congresses: An Illustrated History, 1893–1986* by Donald J. Albers, G. L. Alexanderson, and Constance Reid for information about all of the Fields Medalists.

1948 Physicists Hans Bethe and George Gamow become acquainted with a bright young physicist with such an unusual name that they decided to write a joint paper, which was submitted to *The Physical Review* on this date. Its only unusual feature was its by-line, "by Alpher, Bethe, and Gamow." [Eves, *Revisited*, 268°]

1967 The Uniform Time Act of 1966 (80 Stat. L. 107, April 13, 1966), effective 1 April 1967, divided the U.S. into eight time zones: eastern, central, mountain, Pacific, Yukon, Alaska, Hawaii and Bering. (Kane, p. 667) See 18 November 1883.

1975 Martin Gardner announced that in November 1974, William McGregor, a graph theorist of Wappingers Falls, N.Y., discovered a counterexample to the four-color conjecture. He produced a map containing 110 regions that requires five colors. This "Mathematical Games" column provoked over one thousand letters including a threatened lawsuit from Ivan Guffvanoff III at the University of Wisconsin who destroyed his disproof after reading of this counterexample in *The New York Times*. The mathematics students at the University of Warwick realized that the column was an April Fool's joke, for they published this poem in *Manifold*, a journal of mathematical humor:

> "Oh Mr. Gardner,
> What have you done?
> You've started up a rumour
> You should never have begun!
> A four-colour hoax can't

> Be undone so quick . . .
> Oh Mr. Gardner, what
> A bloody silly trick!"

For more details see *Time Travel and Other Mathematical Bewilderments* by Martin Gardner, 1988, pp. 134–135.

2001 Lord K. Elvin, of the Institute for Haughty Attitudes, will submit a paper entitled "What every young mathematician should know," to the *Bulletin of the Advanced Mathematical Society* that calls attention to the result

$$\int_{-\infty}^{\infty} e^{-x^2}\, dx = \sqrt{\pi}.$$

The paper ends with a quote from the author's "namesake": "A mathematician is one to whom *that* is as obvious as that twice two makes four is to you." For a preprint see M. D. Spivak, Ph.D., *The Joy of T$_E$X* (1986), p. 666. The number of the beast is also p. [*iv*].

## 2 April

999 Gerbert was elected Pope Sylvester II. He introduced into the West the practice of making calculations by using marked discs (apices). This method, which has nearly all the advantages of positional arithmetic, was used in abacus calculations throughout the eleventh and twelfth centuries. [Dedron, p. 168]

1792 U.S. Mint established. It was Jefferson who suggested decimal coinage.

1845 Fizeau and Foucault take the first successful photograph of the sun.

1933 Emmy Noether's right to teach at Göttingen was withdrawn because of her Jewish ancestry. The resulting infusion of scientists played a major role in transferring mathematical leadership from Germany to the United States. See *AMM*, 90(1983), 717.

1934 Birthdate of Paul Cohen. In 1963 he proved, using his technique of forcing, that the axiom of choice and the continuum hypothesis are independent of the other axioms of set theory. For this work he received the Fields Medal in 1966.

1943 "Electronic Differential Analyzer" report submitted.

1948 Kurt Gödel became a United States citizen. Being the diligent individual that he was, he studied the constitution carefully beforehand and felt that he had found a contradiction. On the way to the ceremony Einstein and von Neumann tried to keep his mind on other issues, but when the judge called them into his chambers (so that he could meet Einstein) he asked Gödel if he had anything to say. It was only with considerable effort that his friends were able to change the subject when Gödel brought up the contradiction.

1984 First day of the baseball season. The exact width of home plate is irrational: 12 times the square root of two. History: The plate was originally a circle of diameter one, then a square of the same size(!), which, by mistake was a one-by-one square. Then the corners were filled in to make the current pentagonal plate. [Need to find a uniform way of updating this.]

## 3 April

1717 Death of Jacques Ozanam, noted for his book on mathematical recreations. "He was wont to say that it was the business of the Sorbonne doctors to discuss, of the pope to decide, and of a mathematician to go straight to heaven in a perpendicular line." [DSB 10, 264].

1817 Friedrich Ludwig Wachter (1792–1817), a student of Gauss, called the geometry obtained by denying Euclid's parallel postulate "anti-Euclidean geometry". Had he returned from his customary evening walk on this date he might now be known as one of the founders of non-Euclidean geometry. [G. E. Martin, *Foundations of Geometry and the Non-Euclidean Plane*, p. 306]

1827 Ernst Florenz Friedrich Chladni, physicist and amateur musician, died. He is best remembered for the spectacular symmetrical patterns formed when a sand covered plate is vibrated with a violin bow. See DSB 3, 258.

1909 Birthdate of Stanislaw Ulam.

1964 It is reported in the *New York Times* that the casinos in Las Vegas have changed their rules in blackjack so as to defeat the winning strategy devised by Edward O. Thorp. See 27 March 1964.

1983 The Republic of China (Taiwan) marks the 400th anniversary of the arrival of Father Matteo Ricci (1552–1610) in China with a pair of stamps. [Scott #2359–2360]

## 4 April

1617 John Napier, inventor of logarithms, died, most likely of gout. [P. Hume Brown in the *Napier Tercentenary Volume*, p. 48; Thanks to Kullman]

1692 *Acta eruditorum* contained, under a pseudonym, Vincenzo Viviani's problem of constructing in a hemispherical cupola four equal-sized windows such that the remaining area of the cupola is quadrable. The problem was solved by Leibniz (date?), Guido Grandi (1699), and Viviani himself (1692). [DSB 5, 499]

1809 Benjamin Peirce born in Salem, MA. He taught at Harvard for 49 years. Early on, he and the other young mathematics tutor, Charles W. Eliot, secured the innovation of written final examinations. Previously all exams were oral. Eliot later became president of Harvard. [Midonick, *The Treasury of Mathematics*, p. 610]

1870 Benjamin Peirce wrote in the introduction of his "Linear Associative Algebra," doubtless his most original mathematical work: "This work has been the pleasantest mathematical effort of my life. In no other have I seemed to myself to have received so full a reward for my mental labor in the novelty and breadth of the results." [*MAA* **32**(1925); p. 15 of Benjamin Peirce, MAA offprint of 1925]

1949 Shing-Tung Yau born in Kwuntung, China. In 1982 he received a Fields Medal for his work in differential equations and algebraic geometry.

1983 "Number theory, an abstruse specialty concerned with the properties of whole numbers." Quoted from *Time* by André Weil in his *Number Theory, An Approach through History*.

## 5 April

1607 Honoré Fabri, or Honoratus Fabrius, born in France. He developed the infinitesimal methods of Cavalieri and Torricelli and his quadrature of the cycloid inspired Leibniz. Some of his geometrical work boils down to special cases of $\int x^n \sin x \, dx$, $\int \sin^n x \, dx$ and $\int \int \arcsin x \, dx \, dy$. [DSB 4, 506]

1684 William Brouncker died in London. He was the King's nominee and first president of the Royal Society of London (1666–1677). In 1656 he gave the continued fraction expansion:

$$\frac{\pi}{4} = 1 + \cfrac{1^2}{2 + \cfrac{3^2}{2 + \cfrac{5^2}{2 + \ddots}}}$$

and used it to calculate $\pi$ correct to ten decimal places. [DSB 2, 507]

1752 Taxes are due in England. Previously they were due on March 25, the first day of the year, but because the adoption of the Gregorian calendar reform necessitated the dropping of eleven days, the tax date was changed also. Apparently the tax collectors couldn't do fractions.

1792 George Washington cast the first presidential veto. Amazingly, mathematics was involved. It was the first bill for apportionment of the House, which used the method of Alexander Hamilton: First determine the number of seats (they used 120) and then use the population of the individual states to determine the *quota* of seats that each state should get. These quotas will be decimals. Now give to each state the number of representatives signified by the whole

number part of the quota. Then distribute the remaining seats to the states with the largest decimal part. Washington "negated" the bill because the representatives did not represent the same number of people in each state, as the constitution required. For full details see Michael L. Balinski and H. Peyton Young, *Fair Representation. Meeting the Ideal of One Man, One Vote,* (1982), p. 19.

## 6 April

648 B.C.   First Greek record of a total solar eclipse is made. See June 4, 780 B.C., and October 13, 2128 B.C.

1829   Niels Henrik Abel, age 26, died of tuberculosis. In 1929 Norway issued four stamps for the centenary of his death. [Scott #145–148]

1909   Ernst Zermelo (1871–1953) liked to argue that it is impossible for anyone ever to reach the North Pole, because the amount of whiskey needed to reach any latitude is proportional to the tangent of that latitude. Unaware of this argument, Robert E. Peary wrote in his diary on this date. "The Pole at last!!! The prize of 3 centuries, my dream & ambition for 23 years. Mine at last. I cannot bring myself to realize it. It all seems so simple . . . ." Peary, his remarkable Black associate, Matthew Henson, and four Eskimos were the first humans to reach the North Pole. See *The National Geographic Society. 100 Years of Adventure and Discovery* (1987), pp. 53 & 59. [Reid, *Hilbert*, p. 97.]

1922   Emmy Noether named "unofficial associate professor" at Göttingen. This purely honorary position reveals the strong prejudice of the day against women. [DSB 10, 138 and A. Dick, p. xiii.]

1938   DuPont researcher Roy Plunkett and his assistant, Jack Rebok, discovered polytertrafluoroethylene, the slipperiest man-made substance. Teflon became a household word in 1960 when Teflon-coated frying pans were introduced. The Manhattan Project used it in producing Uranium-235, for it was the only gasket material that would contain the corrosive hexaflouride.

1956   The first circular office building, the Capital Tower, at Hollywood and Vine in Los Angeles, was dedicated. The building has a diameter of 92 feet and a height of 150 feet. Above the 13 floors was a 90 foot spire from which a beacon flashed the word "Hollywood" in Morse code. [Kane, p. 140]

1967   Spain issued a stamp picturing Averroës (1126–1198) [Check dates. 1120?], physician and philosopher. [Scott #1461]

1972   Cray Research founded.

## 7 April

1866   Birthdate of Erik Ivar Fredholm.

1923   Peter Hilton born. This noted topologist has considerable interest in mathematics education. For an interview with him see *Mathematical People* edited by Donald J. Albers and G. L. Alexanderson.

1933   Raymond Edward Alan Christopher Paley, 26, was killed in an avalanche while skiing near Banff, Alberta, Canada. G. H. Hardy wrote of this young analyst: "There is something very intimidating to an older man in such youthful quickness and power, and of all the people who frightened me when I came back to Cambridge, Paley was the man who frightened me the most." [*Collected Papers of G. H. Hardy*, vol. 7, p. 745.]

1953   IBM 701 formally dedicated at a luncheon at which Oppenheimer was the principal speaker. It used electrostatic storage tubes, a magnetic drum, and magnetic tapes. In all, 19 of these machines were built, and IBM was launched into the new world of electronic computers. [Goldstein, *The Computer from Pascal to von Neumann*, p. 328]

1970   The Netherlands issued a set of five stamps designed with the aid of a computer. See *Journal of Recreational Mathematics*, 4(1971), 20–23, for pictures and discussion.

1978 An editorial in the *Pensacola Journal* on minimum competency in English and mathematics stated, "After all, if you give the test to four students and four flunk, that's a 50 percent failure rate." [*The AMATYC Journal*, 13(1979), 59]

1981 The fastest computation of the 13$^{\text{th}}$ root of a 100-digit number is in 1 minute and 28.8 seconds by Willem Klein. [Guinness]

1989 To start his after-dinner remarks at a meeting of the Ohio Section of the MAA, Gerald Alexanderson told the following story that he had heard from Pólya, who heard it from Lebesgue: At the coliseum in Rome the emperor ordered a lion to be brought into the arena with a christian. The christian whispered something in the lion's ear and the lion became meek and whimpered away. This scene was repeated with increasingly ferocious lions. Finally the emperor told the christian that he could go free if he would tell him what he was saying to the lion. The response was truly frightening: "After dinner you have to give a speech."

## 8 April

1796 Gauss completes his first proof (of six) of quadratic reciprocity. [Buhler, *Gauss*, 32]

1799 The date of the still uninterpreted cryptic entry

<div align="center">REV. GALEN</div>

in Gauss's scientific diary. [Thanks to Howard Eves]

1829 A letter arrives at Abel's home informing him of his appointment to a professorship at the University of Berlin. Unfortunately he had died two days previously. [Gallian, *Contemporary Abstract Algebra*, p. 25]

1903 Aurel Wintner born. In 1929 he published the first proofs of the basic facts in Hilbert space—the fundamental mathematical construct in the then-developing physical theory of quantum mechanics. [DSB 14, 454]

1943 The Rockerfeller Foundation review announced that the "differential analyzer" at MIT was built at a cost of $130,500.

## 9 April

1626 English philosopher, Francis Bacon, died a month after performing his first scientific experiment. He stuffed a chicken with snow to see if this would cause it to spoil less rapidly. The chill he caught during this experiment led to his death. [A. Hellemans and B. Bunch. *The Timetables of Science*, p . 32].

1673 Leibniz elected Fellow of the Royal Society of London, a position of which he was very desirous. [*The Correspondence of Henry Oldenburg*, 9, p. 583].

1810 Laplace announced his central limit theorem.

1833 Peterborough, New Hampshire established the first free public library (supported by taxation) in the U.S.

1865 Charles P. Steinmetz born. In 1888 he was about to receive his Ph.D. in mathematics from the University of Breslau but fled the country to avoid arrest as a socialist. This hunchback with a high squeaky voice published several papers in mathematics, but earned his living as an electrical engineer. [*A Century of American Mathematics*, Part 1, p. 14].

1869 Birthdate of Elie Cartan, who worked on analysis on differential manifolds. [DSB 3, 95]

1878 Marcel Grossmann born. He was a classmate of Albert Einstein. When Einstein sought to formulate his ideas on general relativity mathematically, he turned to Grossmann for assistance. [DSB 5, 554]

1919 J. Presper Eckert born.

1931 Heisuke Hironaka born in Yamaguchi-Ken, Japan. In 1970 he won a Fields Medal for generalizing work of Zariski on the resolution of singularities of algebraic varieties.

## 10 April

1651 Ehrenfried Walther Tschirnhaus born. Together with Leibniz he studied the unpublished papers of Descartes, Pascal and Roberval. His algebra, which Newton hoped to publish in an annotated translation, contains one of the earliest statements of the quadratic formula in a form identical to what we use today. See DSB 13, 479.

1755 Simpson introduced error distributions.

1790 First patent law enacted in the U.S.

1793 Gaspard Monge was permitted to resign from the Ministry of the Navy and the Colonies of France in order to undertake the urgent task of supplying the French army with gunpowder. [Thanks to Howard Eves]

1813 Joseph Louis Lagrange died, in his 76$^{th}$ year. [Thanks to Howard Eves]

1857 Birthdate of Henry Ernest Dudeney (pronounced with a long "u" and a strong accent on the first syllable, as in "scrutiny"). He was England's greatest maker of puzzles of mathematical interest, publishing six books of puzzles. His first work appears under the pseudonym "sphinx." Although he never met Sam Loyd, they were in frequent correspondence and informally exchanged ideas. For samples of his puzzles see *536 Puzzles & Curious Problems*, by Henry Ernest Dudeney (Edited, 1967, by Martin Gardner)[p. vii].

1882 The U.S. issued its first postage stamp honoring President James A. Garfield (1831–1881). His only claim to mathematical fame was a new proof of the Pythagorean Theorem. [Scott #205]

1883 Richard von Mises, probabilist, born.

1911 Death of Sam Loyd, Americas greatest puzzlist. His son edited several collections of the father's puzzles, including the mammoth *Cyclopedia of Puzzles*, which he privately printed in 1914. It remains today the largest, most interesting collection of puzzles ever printed. For a selection see *Mathematical Puzzles of Sam Loyd*, edited by Martin Gardner, Dover 1959 [p. xiv].

1914 Moritz Cantor, historian of mathematics, died.

1971 Lebanon issued a stamp honoring Hassan Kamel al-Sabbah (1894–1935). [Scott #C622]

## 11 April

1914 Dorothy Bernstein born in Chicago. After earning her Ph.D. under J. D. Tamarkin at Brown in 1939 she taught at Mount Holyoke, Wisconsin, Berkeley, Rochester, and Goucher. She works in applied mathematics. See Grinstein and Campbell, *Women of Mathematics* for further details.

1936 Zuse patent filed for automatic execution of calculations.

1970 France issued a stamp honoring the physicist Maurice de Broglie (1875–1960). He is pictured with a spectrograph. [Scott #B439]

1974 Abraham Robinson, creator of non-standard analysis, died.

## 12 April

1734 Thomas Fantel de Lagny, who computed $\pi$ to 112 decimal places using Gregory's series, died. Maupertius was called to de Lagny's deathbed, and finding the poor man unconscious, asked him for the square of 12. Like an automaton, de Lagny rose in bed, gave the answer, and immediately passed away. [Eves, *Circles*, 238° and Allen Debus, *World Who's Who in Science*]

1743 George Cheyne died. His 1703 error-filled work on the calculus (David Gregory counted 429 errors) so provoked Newton that he published his own work on quadratures in the 1704 edition of his *Optics*. [DSB 3, 244]

1794 Germinal Pierre Dandelin born. He is known for his ingenious use of spheres in a cone to show that the definitions of the conics as sections of a cone are equivalent to the loci definitions. [DSB 3, 554]

1842 The first mutual life insurance company in the U.S. was chartered. Since such companies must employee many actuaries, this provides a good source of jobs for individuals with a knowledge

of mathematics.

1852 Carl Louis Ferdinand von Lindemann born. He showed $\pi$ transcendental; consequently the circle cannot be squared.

1898 Marie Curie presented, to the Académie des Sciences, a preliminary note that marked the first step in the discovery of radium and opened to mankind the immense world of nuclear physics. [DSB 3, 507]

1961 In Syracuse, Italy, the scientific festivities began to celebrate the memory of Archimedes who was born in the city in 287 BC and was killed there in 212 BC by a Roman soldier. His last words, according to Livy, were "Nolitangere circulos meos" (Don't touch my circles). [*Scripta Mathematica*, 26(1961), 143]

1961 Yuri Gagarin became the first man in space, orbiting the earth in 108 minutes in the Soviet spacecraft *Vostok*.

1977 Fiji issued a stamp showing a world map in sinusoidal projection. [Scott #374] [State its advantages]

1981 First flight of the Space Shuttle *Columbia*, the world's first reusable manned space vehicle, by astronauts John W. Young and Robert L. Crippen. The HP 41 calculator was used on this flight. In fact, the hand-held calculator is one byproduct of the space program.

## 13 April

1743 Thomas Jefferson born.

1791 Legendre is named one of the French Academy's three commissioners for the astronomical operations and triangulations necessary for determining the standard meter. The others were Mechain and Cassini IV. [DSB 8, 136]

1869 Ada Isabel Maddison born in Cumberland, England. She attended Girton College, Cambridge, in the same class with Grace Chisholm Young and they attended lectures of Cayley. Then she came to Bryn Mawr, where she earned her Ph.D. in 1895. She continued there until retirement, involved mostly in administrative work. See Grinstein and Campbell, *Women of Mathematics*.

## 14 April

1611 The term "telescope" was introduced by Prince Federico Cesi at a banquet given in Galileo's honor. It derives from the Greek "tele" meaning "far away" and "skopéo" meaning "to look intently." For a change, a term which derives from the Greek was actually coined by a Greek, namely Ioannes Demisiani. [Willy Ley, *Watchers of the Skies*, p. 112]

1628 Webster copyrighted the first dictionary.

1629 Christiaan Huygens born.

1790 Mathurin Jacques Brisson (1723–1806) proposed to the Paris Academy the establishment of a system of measurement resting on a natural unit of length. The general idea of decimal subdivision was obtained from a work of Thomas Williams, London, 1788. [Cajori, *History of Mathematics*, p. 265] See 19 March 1791 and DSB 9, 554.

1855 The first chess problem of Sam Loyd, age fourteen, was published in the *New York Saturday Courier*. Within a few years he was recognized as the nation's foremost composer of chess problems. Once he announced that he had discovered a way to mate a lone king in the center of the board with a knight and two rooks. Readers were first furious, afterwards amused, by his preposterous solution: line them up in the order knight, rook, king, rook. [*Mathematical Puzzles of Sam Loyd*, edited by Martin Gardner, Dover 1959, p. xi-xii]

1931 The first issue of the review journal *Zentralblatt für Mathematik* was published by Springer. The MAA's Award for Distinguished Service was given to Otto Neugebauer for his role in founding it and its American counterpart, *Mathematical Reviews*. See AMM 86 (1979), 77–78.

1935 Emmy Noether died.

## 15 April

1452  Leonardo daVinci born.

1548  Pietro Antonio Cataldi born. In 1613 he published an important early work on continued fractions. The term "continued fraction" was coined by John Wallis in 1655. [DSB 3, 125]

1707  Leonhard Euler born in Basel, Switzerland. He was the most productive mathematician of all times; his still only partly published collected works comprise over 75 large volumes.

1946  France issued a stamp picturing Charlemagne (742–814). [Scott #B427]

1952  The first bank credit card was issued by Franklin National Bank, Franklin Square, New York. Purchases were charged to the bank, which made the payments, and then billed the card holders. [Kane, p. 207]

1968  Data General Corporation founded. The 1981 Pulitzer prize winner *The Soul of a New Machine* describes the development of their ECLIPSE computer.

## 16 April

1446  Death of the architect Filippo Brunelleschi, who helped develop a systematic theory of mathematical perspective. He is especially noted for his design of the Duomo in Florence.

1673  "I conjecture that Mr. Collins himself does not speak of these summations of infinite series because he brings forward the example of the series 1/2, 1/3, 1/4, 1/5, 1/6, ... which if it is continued to infinity cannot be summed because the sum is not finite, like the sum of the triangular numbers, but infinite. But now I am cramped by the space of my paper." Leibniz to Oldenburg, indicating some hint of a distinction between convergent and divergent series. [*The Correspondence of Henry Oldenburg*, 9, pp. 599–600.]

1674  Sluse elected a member of the Royal Society of London. [*The Correspondence of Henry Oldenburg*, 10, p. 483]

1682  John Hadley born. He invented the navigational sextant in 1731.

1705  Newton knighted by Queen Anne at Trinity College. [DSB 10, 83]

1766  Sir John Leslie born.

1823  Ferdinand Gotthold Max Eisenstein born in Berlin, Germany.

1866  "At the meeting held April 16th, 1866, Prof. Cayley called attention to the theorem, that the difference between two consecutive prime numbers may exceed any given number $N - 1$ whatever. For if $a$, $b$, $c$, ... $k$ are the prime numbers not greater than $N$, then $abc \ldots k + 1$, and $abc \ldots k + 1 + N$ may be one or both of them prime, but all the intermediate numbers are composite; that is, the difference of the two successive primes is $= N$ at least." [Proc. London Math. Soc., vol. 2 (1866-69), p. 250]

1873  Alfred Young born.

1894  Jerzy Neyman, statistician, born. He died in 1981.

1938  The first William Lowell Putnam competition was held. It was won by the team of three from the University of Toronto. Irving Kaplansky was one of the team members. For the history of this now famous exam for undergraduates, see *AMM*, **72**(1965), p. 474.

## 17 April

1761  Deathdate of Thomas Bayes who did important early work on statistical inference. [DSB 1, 531]

1798  Birthdate of the geometer Etienne Bobillier. [DSB 2, 213]

1853  Arthur Moritz Schoenflies born. He discovered, independently of E. S. Fedorov, the 230 crystallographic groups and did early work in set theory and topology. [DSB 12, 195]

1935  Turkey issued a series of semi-postal stamps commemorating the 12$^{\text{th}}$ congress of the Women's International Alliance. One pictured a school teacher. Another was the first stamp honoring

Marie Skłodowska Curie. [Scott #B55, B67]

## 18 April

1557 Maurolico completed the first volume of his *Arithmetic* at three o'clock in the morning on Easter Sunday. [Jean Cassinet, *Mathematics from Manuscript to Print, 1300–1600*, p. 162; Thanks to Dave Kullman]

1775 Paul Revere's Ride. The revolutionary War began the next day. Now you probably think this has nothing to do with mathematics, but how do you suppose he got that lantern up in the church steeple? Easy, he used a key to get in. Since he was a change ringer, a highly mathematical activity, he needed a key to get up to the bells.

1796 Professor E. A. W. Zimmerman sends a short notice of Gauss's work on constructibility of regular polygons (see March 30, 1796) to the *Jenenser Intelligenzblatt*. He adds, "It is worthy of notice that Herr Gauss is now in his 18th year and has devoted himself here in Brunswick to philosophy and classical literature with just as great success as to higher mathematics." [Tietze, 204]

1831 Founding of the University of the City of New York. [Muller]

1906 San Francisco earthquake and resulting fires destroy the city. [*American Heritage Magazine*, Feb/March, 1983]

1907 Lars Valerian Ahlfors born in Helsinki. In 1936 he received a Fields Medal for his work on Riemann Surfaces.

1949 Charles Louis Fefferman born in Washington, D.C. In 1978 he received a Fields Medal for his work on complex analysis.

1955 Albert Einstein died.

1958 India issued a stamp commemorating the centenary of the birth of Dr. Dhondo Keshav Karve (1858–1922), pioneer of women's education. [Scott #299]

## 19 April

1486 Michael Stifel born. This number mystic (for his "beasting" of Pope Leo X, see Eves, *History*, p. 199) became the greatest German algebraist of the sixteenth century. He died on the same date in 1567. [Muller]

1739 Nicholas Saunderson died of scurvy at age 56. At age 1 he became blind from smallpox. This did not prevent him from learning Greek, Latin and French and "hearing" the works of Euclid, Archimedes, and Diophantus in the original, learning some parts by heart. He created a "palpable arithmetic," a nailboard for doing arithmetic and forming diagrams with silk threads—the forerunner of the geoboard. He became Lucasian professor at Cambridge in 1711 and earned a reputation as an excellent teacher.

1801 Gustav Theodor Fechner born.

1839 Dorothea Gauss, mother of Carl Friedrich Gauss, died (following four years of total blindness) in her famous son's home. [Thanks to Howard Eves]

1879 "A red letter day in Massachusetts. On that day the second circular which launched the Harvard 'Annex', later Radcliffe College, was sent out ..." Mathematics 2 dealt with plane geometry and algebra through quadratics. [*Scripta Mathematica*, 11(1945), p. 260]

1933 Deathdate of Ernest William Hobson, the British analyst who fought against "the superstition that it is impossible to be 'rigorous' without being dull." "Althouth he lived to be seventy-six he was active almost up to his death; his last book (and perhaps in some ways his best) was published when he was seventy-four. He was a singular exception to the general rule that good mathematicians do their best work when they are young." See *The Mathematical Intelligencer*, 6(1984), no. 2, p. 9.

1957 First FORTRAN program run.

1958 France issued a stamp to honor Jean Cavaillès (1903–1944) as a hero of the French Underground during World War II. [Scott #879]

1975 India's first scientific satellite was successfully launched from a Soviet cosmodrome with the help of the Soviet rocket carrier at 1300 hours Indian standard time. The satellite was named Āryabhaṭa, after the famous Indian astronomer and mathematician, who was born in Kusumapura, near present-day Patna, in A.D. 476. [Eves, *Return to Mathematical Circles*, 7°]

1977 The German Democratic Republic issued a stamp commemorating the 200th anniversary of Gauss's birth, 30 April 1777. Besides a portrait of Gauss there is a geometric construction (dealing with the constructible regular polygons?). Why wasn't it issued on the anniversary day? [Scott #1811]

1988 In an article entitled "Hot hands phenomenon: A myth?" the *New York Times* (pp. 23, 25) reported on work of the Stanford Psychologist A. Iversky. Most fans believe that a player who has made a string of baskets is likely to succeed on the next try. By examining thousands of shots of the Philadelphia 76ers over a season and a half, Iversky has shown otherwise: Outcomes of successive shots are independent. [*Mathematics Magazine* 61 (1988), p. 268].

## 20 April

1833 The great German geometer Jakob Steiner received an honorary degree from the University of Königsberg. [DSB 13, 14]

1902 Pierre and Marie Curie extract radium from naturally occurring ores.

1932 Giuseppe Peano, 73, died, after teaching his regular classes the previous day. He axiomatized the natural numbers (1889), elementary geometry (1889), and many other systems. One could say that axiomatization was Peano's forte! See DSB 10, 441–444.

1975 India issued a stamp to celebrate the launching of the Āryabhaṭa satellite the previous day. This has to be a record for a quick celebration with a stamp. [Scott #655]

## 21 April

1547 In a dispute over the priority for solving cubics, Tartaglia sent Ferrari 31 challenge problems. They were no harder than those in Luca Pacioli's *Summa* (1494). See 24 May 1547.

1652 Birthdate of Michel Rolle, whose favorite area of research was the theory of equations. He introduced the symbol we use for $n$[th] roots. See DSB 11, 512.

1692 David Gregory delivered his inaugural lecture as Savilian professor of astronomy at Oxford. He received his post on the recommendation of Newton. See DSB 5, 522.

1791 Benjamin Bannaker, the outstanding Black self-taught mathematical-astronomer, completed the outline of the boundaries of the federal district, Washington D. C.

1910 Halley's comet passed perihelion.

1951 Michael H. Freedman born in Los Angeles. In 1986 he received a Fields Medal for his proof of the four-dimensional Poincaré conjecture.

## 22 April

1592 Wilhelm Shickard born. He invented and built a working model of the first modern mechanical calculator. [DSB 12, 162]

???? In the century and a half between 1725 and 1875, the French fought and won a certain battle on 22 April of one year, and 4382 days later, also on 22 April, they gained another victory. The sum of the digits of the years is 40. Find the years of the battles. For a solution see Ball's *Mathematical Recreations and Essays*, 11th edition, p. 27.

1724 Immanuel Kant born in Königsberg, Germany. He did work on the philosophy of mathematics.

1816 The French general, Charles Denis Sauter Bourbaki was born. There is a statue of him in Nancy, France, where Jean Dieudonné once taught. The polycephalic mathematician Nicolas Bourbaki was named after him. See Joong Fang, *Bourbaki*, Paideia Press, 1970, p. 24.

1925 Felix Klein died. In 1905 he recommended the teaching of calculus in the German secondary schools. [DSB 7, 399]

1929 Michael Francis Atiyah born in London. In 1966 he received a Fields Medal for his work on $K$-theory, the index theorem for elliptic operators, and a fixed point theorem in topology.

## 23 April

1484 Birthdate of Julius Scaliger, critic of the Gregorian calendar reform.

1616 Miguel de Cervantes Saavedra and William Shakespeare both died on this date, the former in Madrid, Spain, the latter in Stratford-on-Avon, England. Which one died first? This is not a trick question; they died several days apart. All you need to solve it is some knowledge of the calendar. (Curiously, Shakespeare was born on this date in 1564.)

1827 Sir William Hamilton presented an abstract of "Theory of systems of rays" to the Royal Irish Society. [Bell, *Men of Mathematics*, 346]

1844 Jozef Körösy born.

1858 Max Plank, German physicist, born.

1910 Shiela Scott Macintyre born in Edinburgh. She was the author of a dozen papers on analysis. For more information about her see *Women of Mathematics* by Grinstein and Campbell, p. 140.

1948 Contract signed by A. Nielsen for UNIVAC I.

1982 "It is sometimes said that the idea of the derivative was motivated chiefly by physics .... However plausible these suggestions may sound, and however important physics was in the later development of the calculus, physical questions were in fact neither the immediate motivation nor the first application of the calculus." Judith V. Grabiner in a talk at Ball State as published in *Mathematics Magazine*, 56(1983), p. 198.

1985 The Boston Latin School celebrated its 350th birthday. It is one year older than Harvard. See *New York Times Magazine*, 21 April 1985.

## 24 April

1620 John Graunt born. His only book, *Natural and Political Observations . . . upon the Bills of Mortality* (1662), was the foundations of both statistics and demography. See DSB 5, 507.

1800 The Library of Congress established [2 Stat. L. 56]. $5000 was appropriated "for the purchase of such books as may be necessary for the use of Congress at the said city of Washington and for filling up a suitable apartment for containing them and for placing them therein." The first catalog, dated April 1802, listed 964 volumes and 9 maps. [Kane, p. 350]

1897 The Chicago Section of the American Mathematical Society held its organizational meeting in Chicago under the chairmanship of E. H. Moore. It was the first section of the AMS. [Cajori, *Historical Introduction to the Mathematical Literature*, p. 34]

1930 Death of Henry Ernest Dudeney, England's greatest puzzlist. He was unusually skilled at geometrical dissections—cutting a polygon into the smallest number of pieces that can be refitted to make a different type of polygon. He was also the first to apply digital roots, a term he coined, to recreational mathematics. For samples of his puzzles see *536 Puzzles & Curious Problems*, by Henry Ernest Dudeney (Edited, 1967, by Martin Gardner)[p. viii-ix].

1949 Columbia issued a stamp honoring the mathematician Julio Garavito Armero (1865–1920). [Scott #573]

1980 The winning number in the Pennsylvania lottery was 666. On this day a group of men bet some $20,000 on all combinations involving just 4 and 6. The state lost two million. In 1982 two men were convicted of a lottery fix. Ironically, on the day they went to prison, Delaware's daily number came up 555.

1984 The Morgan Hill Earthquake with an acceleration of 1.3 G's is the "fastest" on record. It shook up a meeting of the International Study Group for History and Pedagogy of Mathematics in San Francisco (25 miles North). [Thanks to Smoryński]

## 25 April

1611 Galileo became a member of the Accademia dei Lincei. [DSB 11, 96]

1832 In a debate over the apportionment of the House, Senator Dickerson of New Jersey invoked the language of Berkeley's *Analyst* when he railed against using Jefferson's apportionment method wherein fractions are ignored: "These quasi-representitives, these infinitesimal, evanescent Representatives, these ideal Representatives, these ghosts of Representatives, after being counted in order to give the favored States their full proportion of a House of 250, are dismissed the service." [P. 34 of the reference cited at 5 April 1792]

1849 Christian Felix Klein born in Düsseldorf, Germany († 1922). In 1871 he constructed projective models for the three types of non-Euclidean geometries—the so-called Klein models. This work popularized non-Euclidean geometries among mathematicians. [DSB 7, 397]

1879 Edwin Bidwell Wilson born. As a student of Willard Gibbs at Yale he codified the physicist's lectures on vector analysis into a textbook (1901) that profoundly influenced the use and notation of the subject. In 1912 he published a comprehensive text on advanced calculus that was the first really modern book of its kind in the U.S. [DSB 14, 437]

1900 Wolfgang Pauli, physicist, born.

1961 Noyce patent issued for the semiconductor.

2038 The next time that Easter will occur on April 25, the latest possible date. The last time Easter was on April 25 was in 1943.

## 26 April

1600 Death of Cunradus Dasypodius whose fame is based on the "construction of an ingeneous and accurate astronomical clock in the cathedral of Strasbourg, installed between 1571 and 1574." [DSB 3, 585]

1711 David Hume, philosopher, born in Edinburgh, Scotland.

1874 Edward Vermilye Huntington born († 1952). This enthusiastic and innovative teacher was professor of mechanics at Harvard from 1919 to 1941. He made many contributions to the logical foundations of mathematics. His book, *The Continuum* (1917), was the standard introduction to set theory for many years. In 1928 he recommended the "method of equal proportion" for the apportionment of representatives to Congress; in 1941 this method was adopted by Congress. [DSB 9, 571]

1889 Ludwig Wittgenstein born. This noted philosopher introduced the word "tautology" in his *Tractatus Logico Philosophicus* of 1921. [DSB 14, 468]

1892 Hermite to Stieltjes: "You state this result and then try to mortify me by saying that it is easy to prove. Since I can't succeed in doing it I appeal to your good nature to help me out of this difficulty." [*Two Year Journal*, 11, 49]

1900 Charles Richter born. This American seismologist developed the earthquake magnitude scale which bears his name.

1920 Shapley and Curtis debate the nature of the nebulae.

1920 Srinivasa Aaiyangar Ramanujan died at age 32. This self educated mathematician, who was discovered by G. H. Hardy of Cambridge, is remembered for his notebooks crammed with complicated identities. [DSB 11, 267]

1968 *Time* magazine (p. 41) reports a "Trial by Mathematics" in which a couple was convicted on the basis of mathematical probability. Later the reasoning was found to be incorrect. The discussion there is of interest. See also *Journal of Recreational Mathematics*, 1(1968), p. 183.

1985 A 22-cent commemorative stamp for Public Education in America issued in Boston.

1986 Nuclear reactor number 4 at Chernobyl, USSR, exploded and released a large amount of radioactive material into the atmosphere. [A. Hellemans and B. Bunch. *The Timetables of Science*, p. 597].

## 27 April

1657 Christiaan Huygens published *De ratiociniis in ludo aleae.*

1740 The French Académie des Sciences announced that their prize on the ebb and flow of the tides would be shared between Leonhard Euler, Daniel Bernoulli, Antoine Cavalleri, one of the last of the Cartesians, and Colin Maclaurin, then Professor of Mathematics at the University of Edinburgh. [Niccoló Guiciardini, *The Development of Newtonian Calculus in Britain 1700–1800* (1989), p. 69.]

1783 In a letter to A. M. Lorgna, Gian Francesco Malfatti gave the polar equation concerning the squaring of the circle. [DSB 9, 55] Does this refer to the polar equation of the spiral of Archimedes, $r = a\theta$? [Thanks to Howard Eves]

1837 Paul Albert Gordan, king of the invariant theorists, born († 1912). He found simpler proofs that $\pi$ and $e$ are transcendental. Emmy Noether, the first woman to get a doctorate in Germany, was his student.

1843 Felix Müller born. He compiled the earliest mathematical calendar (that I know of). [Muller]

1961 Patent issued for multilayer circuit boards.

1962 The Netherlands issued a stamp showing Christiaan Huygens' Pendulum Clock as pictured by van Ceulen. [Scott #B365]

## 28 April

1686 Newton shows the handwritten copy of his *Principia* to the Royal Society. [Muller]

1693 Leibniz, in a letter to L'Hospital, explains his discovery of determinants. This work was fifty years before that of Cramer who was the real driving force in the development of determinants. Leibniz's work had no influence because it was not published until 1850 in his *Mathematische Schriften.* [Smith, *Source Book*, p. 267]

1765 Birthdate of Sylvester Françoise Lacroix († 1843), a textbook writer who was noted for his books on the calculus. He coined the phrase "analytic geometry." [DSB 7, 550]

1773 Robert Woodhouse born. He was interested in the "metaphysics of the calculus," i.e., questions such as the proper theoretical foundations of the calculus, the role of geometric and analytic methods, and the importance of notation. [DSB 14, 500]

1817 Gauss wrote the astronomer H. W. M. Olbers, "I am becoming more and more convinced that the necessity of our [Euclidean] geometry cannot be proved, at least not by *human* intellect nor for the human intellect." [G. E. Martin, *Foundations of Geometry and the Non-Euclidean Plane*, p. 306]

1831 Peter Guthrie Tait born in Dalkerth, Scotland.

1903 Josiah Willard Gibbs died.

1906 Kurt Gödel born.

1983 Greece issued a stamp portraying Archimedes and his Hydrostatic Principle. [Scott #1460]

## 29 April

1667 Birthdate of John Arbuthnot († 1735), fellow of the Royal College of Physicians. In 1710, his paper "An argument for divine providence taken form the constant regrularity observ's in the bith of both sexes" gave the first example of statistical inference. In his day he was famous for his political satires, from which we still know the character John Bull. See DSB 1, 208.

1850 William Edward Story born in Boston. He taught at Johns Hopkins with Sylvester and then moved on to Clark University which was, during the early 1890's, the strongest mathematics department in the country. In the 1890's he edited the short lived *Mathematical Reviews.*

1854 Lincoln University, the first university for Blacks, incorporated.

1854 Jules Henri Poincaré born in Nancy, France. He did important work in function theory, algebraic geometry, number theory, algebra, celestial mechanics, differential equations, mathemat-

ical physics, algebraic topology, and philosophy of mathematics. There may never be another universal mathematician like Poincaré. [DSB 11, 51]

1897 Thomson announced the discovery of the electron.

1902 "A billion does not strike the average mind as a very great number in this day of billion dollar trusts, yet a scientist has computed that at 10:40 A.M., April 29, 1902, only a billion minutes had elapsed since the birth of Christ." Precisely when, according to this result, was Christ born? [Quoted by William F. White in *A Scrap-Book of Elementary Mathematics* (1942), p. 9]

1926 Vera Nikolaevna Maslennikova born. Gel'fond supervised her diploma work at Moscow and Sobolev directed her Ph.D. at the Steklov Mathematical Institute. She has published more than 80 papers in the theory of partial differential equations, the mathematical hydrodynamics of rotating fluids, and in function spaces. For more information see the *AWM Newsletter*, vol. 19(1989), no. 2, pp. 10–11.

1925 The first woman, F. R. Sabin, is elected to the National Academy of Sciences (Kane, p. 945). When was the first woman mathematician elected?

1931 Robert Lee Moore elected to the National Academy of Sciences.

## 30 April

1633 Galileo was forced to recant his scientific findings related to the Copernican Theory as "abjured, cursed and detested" by the Inquisition. He was placed under house arrest for the remaining nine years of his life. Legend had it that when Galileo rose from knealing before his inquisitors, he murmured, "e pur, si mouve"—"even so, it does move."

1777 Karl Friedrich Gauss born in Brunswick, Germany († 1855). His poorly educated mother couldn't remember his birthdate, but could relate it to a movable religious feast. To confirm the date of his birth Gauss developed a formula for the date of Easter. [Reference needed. Probably in Dunningham]

1807 Gauss, on this birthday, wrote Sophie Germain thanking her for intervening with the French General Pernety on his behalf. [Thanks to Howard Eves]

1837 Massachusetts became the first state to establish a board of education.

1904 George Stibitz born.

1916 Claude Shannon born.

1957 Konrad Knopp died. He is famous for his work on infinite series.

1982 *Science* (pp. 505–506) reported that Stanford magician-statistician Perci Diaconis solved the problem of which arrangements of a deck of cards can occur after repeated perfect riffle shuffles. The answer involves $M^{12}$, one of the Mathieu simple groups. *Mathematics Magazine* 55 (1982), p. 245].

1984 30 April-4 May 1984. Teacher Appreciation Week. Celebrated the first week of May in Flint, MI. [Chase]

1992 *The New York Times* "in describing the discovery of the new Mersenne prime, felt it necessary to describe the series of primes, which, (according to them) goes: 1, 2, 3, 5, 7, 11, 13, . . . . You will notice that they have slipped in what must be another discover (by one of their wirters?) of the world's smallest prime: 1. I'm sure the mathematicians of the world must be tearing their hair out for having missed this one." [A posting of Ron Rivest to the net.]

—— Walpurgis night or Witches' Sabbath is celebrated on the eve of May Day, particularly by university students in northern Europe.

# MAY

## 1 May

1006 Supernova is observed in the constellation Lupus, the Wolf. [Wadsworth]

1514 The catalogue of a Cracow professor's books included "a manuscript of six leaves expounding the theory of an author who asserts that the earth moves while the sun stands still." The professor was unable to identify the author, as Copernicus prudently withheld his name from his *Commentariolus*. [DSB 3, 402]

1631 Fermat received the degree of Bachelor of Civil Laws from the University of Orleans. He practiced law, but did mathematics. [DSB 4, 566].

1861 Oswego Training School, Oswego, N.Y., established. It was the first state normal school at which students actually conducted classes.

1893 The Chicago World's Fair opened. Felix Klein came from Germany. The plaster models he brought along created a classroom vogue.

1935 Austria issued a stamp for Mother's Day portraying "Mother and Child" after a painting by Albrecht Dürer. He is the mathematician that has the most stamps issued dealing with him. [Scott #376; Germany Scott #362 was issued in 1926–7, so this is the second stamp devoted to Dürer].

1964 John Kemeny and John Kurtz run the first BASIC program at Dartmouth.

## 2 May

1588 Étienne Pascal, after whom the limaçon is named, born.

## 3 May

1841 L. G. J. Jacobi, who made a lengthy study of Euler's and d'Alembert's works, wrote "It is worth noting that it is impossible today to choke down a single line of d'Alembert's mathematics, while most of Euler's works can be read with delight, and they died in the same year [1883]. D'Alembert seems to have been entirely absorbed in *belles-lettres*." [Hawkins, *Jean D'Alembert*, p 63].

1849 Arthur Cayley called to the Bar. He abandoned his fellowship at Cambridge and took up law as he didn't want to take Holy Orders. During his 14 years at the bar he wrote nearly 300 mathematical papers.

1860 Vito Volterra born.

1902 The San Francisco Section of the AMS was founded at a gathering of twenty mathematicians at the Academy of Sciences, San Francisco, CA. [*AMS Semicentennial Publications*, vol 1, p 8].

1934 Henri-Leon Lebesgue elected foreign member of the Royal Society. From 1899 until 1903 he taught at the Lycée at Nancy, France, where he wrote his famous doctoral thesis "Intégrale, longueur, aire," which proposed a now standard extension of the Riemann integral. See *The Mathematical Intelligencer*, 6(1984), no. 2, p. 8.

## 4 May

1677 Isaac Barrow died of an overdose of drugs. [DSB 1, 474]

1733 Birthdate of Jean-Charles Borda, a major figure in the French navy who participated in several scientific voyages and the American revolution. Besides his contributions to navigational instruments he did important work on fluid mechanics, even showing that Newton's theory of fluid resistance was untenable. He is best known for the voting system he created in 1770. [DSB 2, 299]

1780 Founding of the Cambridge Philosophical Society. [Muller]

1780 The American Academy of Arts and Sciences, the first national arts and sciences society in the U.S., was founded on this date in Boston "to cultivate every art and science which may tend to

advance the interest, dignity, honor and happiness of a free, independent and virtuous people."
James Bowdoin was the first president. [Kane, p. 39]

1845 William Clifford born. He played an important role in introducing the ideas of Riemann and other writers on non-Euclidean geometry to English mathematicians. "Clifford was a first-class gymnast, whose repertory apparently included hanging by his toes from the crossbar of a weather cock on a church tower, a feat befitting a High Churchman, as he then was." [DSB 3, 322]

## 5 May

1580 Johann Faulhaber born in Ulm, Germany. This early algebraist developed formulas for sums of powers of natural numbers up to the thirteenth power. He was also important in disseminating the idea of using logarithms for calculation. He was also interested in numerology and attempted to interpret future events from numbers in the Bible. He predicted the end of the world in 1605, was jailed for this 1606 (he later repented and was released), and died in 1635. He was a famous schoolmaster; Descartes studied with him in 1620. [DSB 4, 549].

1827 Laplace died at Arcueil, France. His last words were "Ce que nous connaissans est peu de chose, ce que nous ignorons est immense." [What we know is minute, what we are ignorant of is vast.]

1859 Peter Gustav Lejeune Dirichlet died. [Thanks to Howard Eves]

1905 "Frank was a man who believed in the deeper meaning of numbers. He was born on May 5, 1905, and was fifty-five years old. He had five children, and he lived at 555 East 55th Street. For the past five years, he had earned $55,000 as an executive at Sak's Fifth Avenue. On his fifty-fifth birthday, Frank went to the race track and was astonished to find that a horse named Numero Cinquo was running in the fifth race that afternoon. Five minutes before the race began, he went to the fifth window and put down five thousand dollars in five-dollar bills on Number Five. Sure enough, the horse finished fifth." Quoted from *The Big Book of American Humor* (1990) by edited by William Novak and Moshe Waldoks.

1952 IC concept first presented.

1961 Alan B. Shepard is the first U.S. astronaut to make a flight into space. His fifteen minute flight in Freedom 7 from Cape Canaveral, Florida, reached an altitude of 115 (116?) miles and ended 302 miles down the Atlantic missile range. [Kane, p. 373; Navy Facts, 204]

1980 Greece issued a stamp honoring the 2300th anniversary of Aristarchus of Samos, discoverer of the heliocentric theory. [Scott #1350]

1981 The German Democratic Republic issued a stamp honoring Richard Dedekind. [Scott #2181]

## 6 May

1634 Pierre Herigone, the first person to use the symbol for angle, born. [NCTM]

1667 Abraham De Moivre born in Vitry-le-Francois, Champagne, France.

1840 The world's first postage stamp, which portrayed Queen Victoria, was issued by Great Britain. [Scott #1]

1949 EDSAC performs its first calculation.

1950 A famous series begins on this day. Can you guess what it is? The first terms are Nicky Hilton, Michael Wilding, Mike Todd, Eddie Fisher, Richard Burton, Richard Burton, John Warner, Larry Fortensky. Note that one term in the series repeats; that's perfectly natural. Your are right, this is a Taylor series. More specifically, the Elizabeth Taylor series. These are her husbands (eight by last count (2010)).

1954 Roger Bannister defied the general belief that it was impossible to run a mile in less than 4 minutes by running one in 3 minutes 59.4 seconds.

## 7 May

1526 The first circumnavigation of the globe took place in 1519. In 1539 Cardano asked for the

number of days spent if a ship sailed westward on January 1, 1517, and went three times around the earth, returning on May 7, 1526. See Sanford, *History*, pp. 214 and 377.

1747 Johann Sebastian Bach visits King Frederick II of Prussia, the visit resulting in his *Musikalische Opfer* (Musical offering). See D. R. Hofstadter's *Godel, Escher, Bach*, p. 4. [Manson]

1774 Birthdate of British naval officer, Sir Francis Beaufort, who devised (1805) a scale of wind force from 0 (calm) to 12 (hurricane) which was based on observation and so required no special instruments. [Chase]

## 8 May

1794 The chemist Lavoisier was guillotined in the terror following the French Revolution. The next day Lagrange commented: "It took them only an instant to cut off that head, and a hundred years may not produce another like it." See DSB 8, 85.

1853 John Farrar died at Cambridge, Massachusetts. His translations from the French, including Legendre's *Elements of Geometry* (Boston, 1819), were widely used in the U. S. [DSB 4, 546].

1961 President J. F. Kennedy presented astronaut Alan B. Shepard the first National Aeronautics and Space Administration Distinguished Flying Medal for making America's first space flight on May 5, 1961.

## 9 May

1694 Johann Bernoulli, in a letter to Leibniz, introduced the term and the explicit process of "seperatio indeterminatarum" or separation of variables for solving differential equations. He published it in *Acta eruditorum* in November, 1694. [Ince, 531]

1746 The noted geometer, Gaspard Monge, son of a peddler and knife grinder, born at Beaune, France. Today there is a statue of him in his home town of Beaune, France. (I stumbled across it while visiting vineyards). For a picture of it, see *The Mathematical Intelligencer*, ????

1848 "Proficiency in Algebra, the elements of geometry, trigonometry, and surveying, will give you the art of developing truth by the skilful use of the reasoning powers, and, besides, store your mind with a species of knowledge of daily practical utility to a lawyer. ... It is the helm of the mind, stering it over the shortest route from the point of departure to the destination—from cause to effect." So wrote the American soldier Albert Sindney Johnson (1803–1862) to his son. From William Preston Johnson (the son), *The Life of General Albert Sindney Johnson* (1878), p. 162, as quoted by Florian Cajori in *Mathematics in Liberal Education* (1928), p. 103.

1876 Birthdate of Gilbert Ames Bliss who did important work in the calculus of variations. Throughout his career at Chicago he stressed the importance of a strong union between teaching and research. [DSB 2, 198]

1926 Byrd's North Pole flight.

1972 100 high school students took the first U.S.A. Mathematical Olympiad. The purpose was to discover secondary school students with superior mathematical talent. One of the five problems on the exam was: "A random number selector can only select one of the nine integers $1, 2, \ldots, 9$, and it makes these selections with equal probability. Determine the probability that after $n$ selections $(n > 1)$, the product of the $n$ numbers selected will be divisible by 10." For the winners, the other problems, and the solutions, see *AMM* 80 (1973), pp 276–281.

1972 The first U.S.A. Mathematical Olympiad (UASMO) was held for high school students. [*The College Mathematics Journal*, 16 (1985), p. 331]

## 10 May

1810 Bessel took up his post as director of the new observatory at Königsbreg. In 1838 he was the first to measure accurately the parallax of a star. [DSB 2, 98–101]

1821 Birthdate of Baldassarre Boncompagni, noted historian of mathematics. He set up his own publishing house and published his own journal dealing with the history of mathematics from

1868 to 1887. He was responsible for making known the importance of Leonardo Fibonacci to the history of mathematics. [DSB 2, 283]

1831 Everiste Galois was arrested, following a banquet, of about 200 young republicans, that he actively attended. [Thanks to Howard Eves]

1869 First railroad spans the U.S.

1933 Kurt Schutte, the last of Hilbert's sixty-nine doctoral students, defends his dissertation on logic. For the full list see Hilbert's *Gesammelte Abhandlungen*, vol. 3, pp. 431–433.

1950 ACE runs first program.

1960 Triton ended her 84 day, 36,014 mile circumnavigation of the globe, the first by a submerged submarine. The ship generally followed the path of the first round the world voyager, Magellan. [Navy Facts, 181, 204]

## 11 May

1702 Isaac Greenwood born. In 1727 he was installed at Harvard as the first Hollis professor of mathematics and natural and experimental philosophy. He strengthened and modernized the science program at Harvard. [DSB 5, 519]

1892 Edgeworth's first Newmarch lecture. [Springer's 1985 Statistics Calendar]

1920 Oxford University passed a statute admitting women to degrees.

1928 The first regularly televised program began on a three-times-a-week schedule from General Electric Station, WGY, Schenectady, New York. The image consisted of 24 scanning lines repeated 20 times a second. [Kane, p. 652]

1951 Forrester patent filed for core memory.

1957 Howard F. Fehr, of Columbia University Teachers College, in an address at Syracuse: "A mathematics professor who talks at length affects both ends of the listener—he makes one end feel numb and the other feel dumb." [Eves, *Revisited*, p. 151] .

1959 Eugene P. Wigner delivered a penetrating Courant Lecture at NYU on "The Unreasonable Effectiveness of Mathematics in the Natural Sciences," which is well worth reading. See *Communications on Pure and Applied Mathematics*, 13(1960), 1–14.

1979 VisiCalc Introduced. It was the first program operable by inexperienced computer users. As it ran only on the Apple, the company soon was on top of the market.

1986 A specially designed bicycle set the human powered land speed record of 105.37 km per hour (65.48 miles per hour). [A. Hellemans and B. Bunch. *The Timetables of Science* p 599].

## 12 May

1364 Founding of the Uniwersytet Jagiellonski in Kraków, Poland. Copernicus was a student there in 1492.

1845 Birthdate of Henri Brocard who published (1897–99) a two volume catalogue of plane curves and their properties. [DSB 2, 479]

1856 J. P. M. Binet died. Cauchy wrote his obituary, the only one he ever wrote. Apparently Cauchy was motivated by their common Bourbon fervour. [Ivor Grattan-Guiness, *Convolutions in French Mathematics, 1800–1840*, p. 192]

1857 Birthdate of Oskar Bolza. After studying with Weierstrass and Klein, and realizing the difficulties of obtaining a suitable position in Germany, he came to the U.S. where he played an important role in the development of mathematics at Hopkins, Clark and Chicago. [DSB 2, 271]

1930 Adler Planetarium, first in the U.S., opens, Chicago. [Wadsworth]

1984 *The Hindu* newspaper from Madras, India, reported the unveiling of a statue of Srinivasa Ramanujan. [*Mathematics Magazine* 57 (1984), p 244].

## 13 May

1753 Birthdate of Lazare-Nicolas-Marguerite Carnot, who published his *Reflections on the Meta-physics of the Infinitesimal Calculus* in 1797. It was written in 1784 for a competition of the Berlin academy seeking a "clear and precise" foundation for the calculus. See DSB 3, 71.

1829 Charles-Francois Sturm presented his theorem for finding the number of real roots of a polynomial equation to the French Academy. See DSB 13, 128–129.

1983 The thirteenth of the month is more likely to occur on Friday than on any other day of the week. In 1983 there was only one Friday-the-thirteenth, the least number possible.

## 14 May

1607 The first permanent English settlement in American was founded at Jamestown, VA.

1631 Pierre de Fermat installed at Toulouse, at age 31, as commissioner of requests. [Thanks to Howard Eves]

1755 Joseph Louis Vincens de Mauléon, governor of the principality of Orange, published his "proof" that the circle could be squared. He claimed this proof enabled him to explain the mysteries of original sin and of the Holy Trinity. Although he offered a prize of 300,000 franks to anyone who could show his proof falacious, it is pure nonsense. [*Osiris*, 1(1936), p. 530]

1797 Giovanni Francesco Fagnano dei Toschi died. He proved that the triangle which has as its vertices the bases of the altitudes of any triangle has those altitudes as its bisectors. [DSB 4, 515]

1863 John Charles Fields born in Toronto, Canada. After earning his Ph.D. at Johns Hopkins in 1887, he taught at Allegheny College (1889-1892) before going to Europe for a decade to study in Paris and Berlin. In 1902 he joined the faculty at the University of Toronto, where he remained until his death on 9 August 1932. [DSB 4, 617].

1893 Ernst Eduard Kummer died, at age 83, after a short attack of influenza. [Thanks to Howard Eves]

1953 Results of the third annual MAA Mathematics Contest for high school students were announced. Tied for fourth place was Geraldine Anne Ferraro who later became the first woman vice-presidential nominee of a major political party.

## 15 May

1048 Birthdate of the mathematician and poet Omar Khayyam. He was the first to claim cubic equations—and hence angle trisection—could not be solved with straightedge and compass. P. Wantzel gave a proof in 1837. [DSB 7, 328]

1618 Kepler discovers his third law of planetary motion. [Wadsworth]

1948 The independent State of Israel established. In 1952 the Israeli government asked Einstein, who had labored for the creation of the State, to accept the presidency of the country. He sadly declined the honor, insisting that he was not fitted for such a position. [Eves, *Adieu*, 118°]

1971 Nicaragua issued a series of stamps showing "mathematical equations which changed the world." They range from $1 + 1 = 2$ (Egyptians counting on their fingers) to Napier's law of logarithms and the Pythagorean Theorem. On the back of each stamp is a descriptive paragraph. [Scott #877–881, C761–5]

1985 At a Columbia University graduation Benoit B. Mandelbrot received the Barnard Medal for Meritorious Service to Science, an award made every five years. He is noted for his work on fractals. [N.Y.Times, 16 May 1985, page B5, col. 1]

## 16 May

1571 Johannes Kepler was conceived at 4:37 a.m. on his parents' wedding night, according to his computations for his own horoscope. [DSB 7, 290]

1695 Leibniz, in a letter to Johann Bernoulli, tells of his discovery of the multimonial theorem, "a wonderful rule for the coefficients of powers not only of the binomial $x + y$, but also of the trinomial $x + y + z$, in fact, of any polynomial." [Smith, *Source Book*, p. 229]

1718 Birthdate of Maria Gaetana Agnesi, the first woman who can accurately be called a mathematician. Her *Istituzioni analitiche* of 1748 was an important calculus text. Her name is most often associated with the cubic curve called the Witch of Agnesi, which gets its name by mistranslation. Her sister Maria Teresa was a noted composer. See DSB 1, 75–77.

1800 Gauss records in his diary "On about these days (May 16) we most elegantly resolved the problem of the chronology of the Easter Feast." [Gray, *Expositiones Mathematicae*, 2(1984), 97–130]

1821 Birthdate of the Russian mathematician Pafnuty Lvovich Chebyshev. For an amusing search for how to spell Tschebyscheff, see *The Thread* (Birkhäuser Boston) by Philip J. Davis, or an article with the same title in the *Two-Year College Mathematics Journal*, 14(1983), 98–104.

1830 Joseph Fourier died. His work on heat was termed by Maxwell, "a great mathematical poem." He traveled to Egypt with Napoleon and became convinced that desert heat was ideal for good health. Consequently, he wore many layers of garments and lived in rooms of unbearably high heat. This hastened his death, by heart disease, so that he died, thoroughly cooked. [Eves, *History of Mathematics*, 362]

1875 Kentucky Derby first run.

1940 Dr. H. J. Spinden reported the decipherment of Mayan relics in Mexico indicate a civilization 1250 years in advance of Europe in astronomy and mathematics.

## 17 May

1630 Belts on Jupiter first recognized.

1719 "The learned Dr. Halley is of opinion that the comet seen in 1680 is the same which appeared in Julius Caesar's time. This shows more than any other that comets are hard, opaque bodies; for it descended so near to the sun, as to come within a sixth part of the diameter of this planet from it, and consequently might have contracted a degree of heat two thousand times stronger than that of red-hot iron; and would have been soon dispersed in vapour, had it not been a firm, dense body. The guessing the course of comets began then to be very much in vogue. The celebrated [Johann] Bernoulli concluded by his system than the famous comet of 1680 would appear again the 17th of May, 1719. Not a single astronomer in Europe went to bed that night. However, they needed not to have broke their rest, for the famous comet never appeared." So wrote Voltaire (1694-1778) in his *Letters on the English or Lettres Philosophiques*, c. 1778.

1749 Clairaut announced to the Academy of Science that Newton's inverse square law of gravitation had been correct after all. See Hawkins *Jean d'Alembert*, p 32ff, for a discussion of this controversy. Also see 15 November, 1747.

1938 "The answer to the question as to the success of Hopkins, Clark, and Chicago, is: men of ability, professors and students with sufficient funds to carry on their work, time for research, and freedom to work in their own way." W. P. Lombard, in a letter. [*Studies in Early Graduate Education* by W. Carson Ryan, Carneigi Foundation, 1939, p. 71]

## 18 May

1850 Otto Heaviside born.

1852 Massachusetts becomes the first state to pass a compulsory attendance law for school children.

1872 Bertrand Russell born.

1901 Charles Sanders Peirce writes George A. Plimpton, head of Ginn and Company and famous collector of rare mathematical books, describing what the contents of a newly acquired book must be were it indeed the great *Liber Abaci* (1202) of Fibonacci. In 1949 Carolyn Eisele's discovery of this letter—still tucked into the back cover of the volume—began her career as a

Peirce scholar. [HM 9, 335]

1933 John Kieran's *Sports of the Times* column in the *New York Times* is entitled "The Coordinate Clash, or Block that Abscissa." The column was a humorous analogy between football and the upcoming mathematical contest between Harvard and Army.

## 19 May

804 The English educator Alcuin of York died at Tours. He was born in 735, the year Bede died. As minister of education under Charlemagne, he attempted to reorganize the educational system by popularizing the study of the seven liberal arts and encouraging the study of mathematics as an aid in determining the date of Easter. He wrote the first book of mathematical recreations, *Propositiones ad acuendis juvenas* (Problems for Sharpening the Minds of Youths), which contained 53 mathematical puzzles, including: A wolf, a goat, and a cabbage must be moved across a river in a boat holding only one besides the ferryman. How must he carry them across so that the goat shall not eat the cabbage, nor the wolf the goat? [Smith, *History of Mathematics*, I, 186; Dedron, 167; DSB 1, 104–105; Eves, *An Introduction to the History of Mathematics*, 4th edition, 229]

1979 In the *Chicago Sun-Times* W. F. Buckley wrote "The Rasmussen Report estimates there will be one melt down every 20,000 reactor-years, and one fatality (from cancer) every 50 reactor-years. Conjoin these data (20,000 divided by 50) and you get the figure of 400 deaths per year." Quoted from the "Hows that again department," AMM 90 (1983), p 220.

## 20 May

1665 Newton's first use of "pricked letters" or dots to indicate fluxions or derivatives. [Cajori, *History of Mathematical Notations*, vol. 2, p. 197] Check this out. It sounds wrong.

1875 The International Bureau of Weights and Measures established by the International Metric Convention, Sevres, France. The bureau is the repository for the "International Prototype Meter" and the "International Prototype Kilogram." In 1975 Norway issued a stamp for the centenary of the International Meter Convention in Paris. It pictures Ole Jacob Broch (1818–1889), the first director of the International Bureau of Weights and Measures. [Scott #655]

1927 Lindberg's nonstop flight across the Atlantic.

1930 The Institute for Advanced Study incorporated. Two and a half years later Albert Einstein and Oswald Veblen were appointed the first professors. [Goldstein, *The Computer from Pascal to von Neumann*, p. 77]

1961 France issued a stamp honoring Charles Coulomb (1736–1806) [Scott #B 352].

1968 A team of six high school students from Upstate New York went to London to participate in the Fourth British Mathematical Olympiad. This was the first time a team from the U.S. participated in an international mathematical competition. [*The College Mathematics Journal*, 16 (1985), p. 331]

1975 Sweden issued a stamp picturing a metric tape measure to honor the centenary of the International Meter Convention in Paris. [Scott #1121]

## 21 May

429 B.C. Plato born in Athens. He died on the same date in 348 B.C. [Muller] [Should it be 427 B.C.?]

1471 Albrecht Dürer, German painter and engraver, born. Mathematicians are fond of his etching

*Melancholia* for it contains the magic square

| 16 | 3 | 2 | 13 |
|----|----|----|----|
| 5 | 10 | 11 | 8 |
| 9 | 6 | 7 | 12 |
| 4 | 15 | 14 | 1 |

Oldstyle numerals are used in the two center squares to emphacize the year that this etching was done by Dürer. There is still debate about the shape of the solid in the foreground of the picture.

1932 Amelia Earhart flew alone across the Atlantic, being the first woman to do so.

## 22 May

1649 Pascal obtained a monopoly by royal decree for his computing machine. [DSB 10, 332]

1866 Herman von Helmholtz published his paper "On the facts that underlie the foundations of geometry," containing an account of elliptic geometry. [Martin, p. 310. Thanks to Kullman] Is this Riemann??

## 23 May

1576 Brahe is given use of the island of Hveen for an observatory. [Wadsworth]

1606 Birthdate of Juan Caramuel Y Lobkowitz. His *Mathesis biceps* of 1670 expounds the general principle of number systems with an arbitrary base *b*. Caramuel points out that some of these might be of more use than the decimal system. [DSB 3, 61]

1857 A few hours before his death, age 68, Augustin-Louis Cauchy was talking animatedly with the Archbishop of Paris of the charitable works he had in view—for charity was a life long interest of Cauchy. His last words were "Men pass away but their deeds abide." [Bell, *Men of Mathematics*, p 293].

1887 Birthdate of Thoralf Skolem, number theorist and logician. At the International Congress of Mathematicians in Cambridge in 1950 he said "We ought not to regard all that is written in the traditional textbooks as something sacred." It was this attitude that earlier allowed him to discover that the real numbers could have countable models, a fact known as Skolem's paradox.

## 24 May

 997 Al-Bīrūnī in Kath and Abū'l-Wafā in Baghdad simultaneously watch a lunar eclipse. The time obtained by this prearranged cooperation allowed them to determine the difference in longitude between the cities. [DSB 2, 149]

1543 An advance copy of his work *De revolutionibus orbium coelestium* was presented to Copernicus. On the same day he died. [*Great Books of the Western World*, vol. 16, p. 500]

1544 William Gilbert, English physician and physicist, born.

1547 Ferrari replied to Tartaglia's letter of 21 April 1547 by sending 31 challenge problems of his own. Tartaglia solved all but the five dealing with cubic equations.

1626 Manhattan bought from the Indians for ??? If invested at 5% ???

1686 Daniel Gabriel Fahrenheit born. He chose the scale on his thermometer to avoid inconvenient and awkward fractions. For the curious history see DSB 4, 517.

1794 William Whewell born. He coined the term "scientist." In 1824 he laid the foundation of mathematical crystallography. [DSB 14, 292–293]

1844 Samuel F. B. Morse, in Washington, sent the first telegraph message in dots and dashes to a friend in Baltimore: "What hath God wrought!" [S. E. Morison, *The Oxford History of the American People*, vol. 2, p. 293.]

1883 Grand opening of the Brooklyn Bridge. Contrary to the *New York Times Magazine* of 27 March 1983, the cables hang in the shape of parabolas, not catenaries.

1973 French mathematicians Jean Guilloud and Mlle. Martine Bouyer computed $\pi$ on a CDC 7600 computer to one million decimal places, the greatest accuracy to date. The value was not verified until September 3, 1973. It is published in a 400 page book. [Guinness]

1983 Marshall Stone received the National Medal of Science, the nation's highest scientific honor, "for his original synthesis of analysis, algebra and topology into the new, vital area of functional analysis, in modern mathematics." *Notices AMS*, v. 30, p. 485, contains more information.

## 25 May

1581 John Dee, mathematician and mystic, first saw spirits in his crystal globe. [Daniel Cohen, *Masters of the Occult* , Dodd and Mead, 1971, p. 28]

1694 Isaac Newton to Nathaniel Hawes: "A Vulgar Mechanick can practice what he has been taught or seen done, but if he is in an error he knows not how to find it out and correct it, and if you put him out of his road, he is at a stand; Whereas he that is able to reason nimbly and judiciously about figure, force and motion, is never at rest till he gets over every rub." Westfall takes this as the title of his fabulous biography of Newton, *Never at Rest*. Reportedly he received one of the early Golden Fleece Awards of Senator Proxmire for a grant to write this book. [But we have been unable to find a reference for this last statement.]

1842 Johann Christian Doppler (1803–1853) presented a lecture on the Doppler effect. It was first expermentally verified in 1845 using a locomotive drawing an open car with several trumpeters. [DSB 4, 167]

1898 Otto Blumenthal (1976–1944), the first of Hilbert's students, defends his dissertation. See 10 May 1933.

1946 The Soviet Union issued two stamps to celebrate the 125$^{th}$ anniversary of Pafnuti Lvovich Chebyshev (1821–1894). [Scott #1050-1].

1961 President John F. Kennedy set a manned mission to moon as a U.S. goal with the words: "I believe we should go to the moon ... before this decade is out." We made it on

## 26 May

1667 Abraham De Moivre born in Vitry-le-François, France. Being a Protestant, he emigrated to England following the Edict of Nantes in 1685 where he eked out a living as a tutor of mathematics. He became thoroughly Anglicized and pronounced his name "Mowve-re."

1899 Birthdate of Otto Neugebauer, historian of ancient and medieval mathematics and astronomy. [AMM 86, 77].

1901 Giuseppe Peano terminated his services to the Royal Military Academy in Turin where he had taught for fifteen years. The trouble was with his teaching. Earlier he was a very good teacher and the author of several excellent texts, but as his work in mathematical logic matured he devoted too much time to what the students called "the symbols." [H. C. Kennedy, *Peano*, p. 100]

1926 Frank Nelson Cole died. At the time of his death he was a professor of mathematics at Columbia, but was living in a boarding house, under an assumed name, claiming to be a bookkeeper. The AMS Cole prize in algebra is named after him. [DSB 3, 345]

## 27 May

1849 Chebyshev defends his doctoral dissertation on the theory of numbers at Petersburg University. [DSB 3, 223]

1937 Golden Gate bridge opened.

## 28 May

585 B.C. Thales predicted the total eclipse of the sun that took place on this date. See Herschel, *Outline*

*of Astronomy* (1902), pp. 833 and 839. [Eves, *Circles*, 33°]

1912 Hans Zassenhaus, algebraist, born.

1959 Committee formed which developed COBOL.

1981 The *New Scientist* (pp 506-507) describes a mathematical theory of how coloration develops in animals. Zebras have stripes rather that spots because coloring is determined at an early stage of the development of the fetus. [*Mathematics Magazine* 54 (1981), p 215.]

## 29 May

1832 Almost certain that he would die in a dual the next day, Evariste Galois first wrote a "Letter to all Republicans," and then wrote to a friend describing his mathematics. It ended: "Eventually there will be, I hope, some people who will find it profitable to decipher this mess." [Burton, *History of Mathematics*, p. 322]. See Smith, *Source Book*, pp. 278–285 for the letter.

1882 Harry Bateman born. He spent much of his life collecting special functions and integrals that solved partial differential equations. He kept the references on index cards stored in shoe boxes—eventaully these began to crowd him out of his office. [DSB 1, 500]

1919 Deflection of light in a gravitational field detected during a solar eclipse, thus confirming a prediction of Einstein of 1915–16 based on his theory of general relativity. [Bell, *Men of Mathematics*, 350]

1957 Romania issued two stamps picturing a slide rule to publicize the $2^{nd}$ Congress of the Society of Engineers and Technicians, which began in Bucharest on this day. [Scott #1159-60].

## 30 May

1423 Georg von Peurbach (or Peuerbach) born in Peuerbach, Austria. He worked on trigonometry astronomy, and was the teacher of Regiomontanus.

1667 Margaret Cavendish, duchess of Newcastle, overcame the prejudice of her day to become the first woman elected to the Royal Society of London. Her prolific writings in the nature of science earned her the nickname "Mad Madge". No other woman was elected FRS until 1945. [A. Hellemans and B. Bunch, *The Timetables of Science*, p 158.]

1832 Galois mortally wounded by a gunshot wound to the abdomen in a duel of honor. He was left for dead after the dual but a peasant took him to a hospital. [Burton, *History of Mathematics*, p. 322].

1800 Karl Wilhelm Feuerbach born in Jena, Germany. His mathematical fame rests entirely on three papers. Most important was this contribution to Euclidean geometry:

> The circle which passes through the feet of the altitudes of a triangle touches all four of the circles which are tangent to the three sides; it is externally tangent to the inscribed circle and externally tangent to each of the circles which touches the sides of the triangle externally.

Be sure to draw a picture. [DSB 4, 601].

1984 Last annular eclipse of the sun visible from North America in this century. [Chase]

## 31 May

1503 Copernicus received a doctoral degree in canon law from the University of Ferrara. [DSB 3, 402]

1764 "I went this far with him: 'Sir, allow me to ask you one question. If the Church should say to you, 'two and three make ten,' what would you do? 'Sir,' said he, 'I should believe it, and I should count like this: one, two, three, four, ten.' I was now fully satisfied." From *Boswell's Journal* as quoted by J. Gallian, *Contemporary Abstract Algebra*, p. 43.

1790 Copyright law passed.

1813  Louis Poinsot elected to the mathematics section of of the French Académie des Sciences, replacing Lagrange. [DSB 11, 61]

1823  In a letter to a cousin, William Rowan Hamilton disclosed that he had made a "very curious discovery." It is believed that he was refering to the characteristic function. [Thanks to Howard Eves]

1832  Galois died of peritonitis from a gunshot wound of the previous day.

1926  John Kemeny born in Budapest, Hungary. He worked on logic with Alonzo Church at Princeton, was Einstein's assistant at the IAS, developed the computer language BASIC, and served as President of Dartmouth College. To learn more about him, see the interview in *Mathematical People. Profiles and Interviews* (1985), edited by Donald J. Albers and G. L. Alexanderson.

1975  "I had today my virginal experience with the HP [Hewlett-Packard 65 calculator] as a celestial triangle-breaker . . . it worked! But I'll keep plotting the sun to make sure." William F. Buckley Jr. discussing celestial navigation in his delightful book, *Airborn, a Sentimental Journey*, about sailing. His caution was justified, for later he learned that the prepackaged program contained errors.

1985  Marion Tinsley retains the world checker championship by defeating Asa Long 6–1. The one game Long won was the first time in nearly 25 years that anyone has beaten Tinsley in a checkers game. But then perhaps Tinsley had an unfair advantage—a Ph.D. in mathematics from Ohio State with a dissertation in combinatorics directed by Herbert Ryser. [Clipping of June 2, 1985]

# JUNE

## 1 June

1631 Pierre de Fermat married Louise de Long (his mother's cousin), who gave him three sons. One of them edited his father's mathematical papers and published them in 1679. [Thanks to Howard Eves]

1658 Pascal posed six questions related to the cycloid as challenge problems. They dealt with area, volume of solids of revolution, and center of gravity. See *Scripta Mathematica*, 26(1963), 297–298 for a list of the problems.

1796 Nicolas-Leonard Sadi Carnot, French physicist, born.

1798 Christian von Staudt born.

1861 Kurt Hensel died. He is best known for his work on $p$-adic numbers.

1866 C. B. Davenport born.

1889 Charles P. Steinmetz arrived in New York City, having fled Breslau because of his socialist views. He went to work for the Eickenmeyer Dynamo Machine Company, later General Electric, as an electrical engineer. In spite of a natural inclination to mathematics, circumstances forced him to become the most distinguished and highest paid electrical engineer in the world. [*A Century of Mathematics in America, Part I*, p. 14].

1798 Christian von Staudt born.

1890 The first census compiled by machine was completed. The previous census took nearly a decade to compute. The 1890 census recorded the U.S. population at 62,979,766. See 8 January 1889. [Kane, p. 169]

1899 Edward Charles Titschmarsh born. His favorite area of mathematics was Fourier transforms, though, later, he worked with Hardy on integral equations.

1944 First COLOSSUS Mark II works.

1966 *Surveyor I* was launched. It was the first American spacecraft to make a soft landing on the Moon. Curiously, the word "spaceship" was defined by the 1958 edition of *Webster's New Collegiate Dictionary* as "An imaginary aircraft of the future for interplanetary travel outside the earth's atmosphere."

1984 June 1–7 was Teacher "Thank You" week. Sponsored by the Lake Superior State College Unicorn Hunters. [Chase]

## 2 June

1913 Millikan announced the results of his experiment to measure the electron charge.

1924 Indians given U.S. citizenship.

1942 Andrew Russell Forsyth died. He worked in differential equations, and function theory.

## 3 June

1657 William Harvey died.

1659 David Gregory born.

1726 James Hutton born. His *Theory of the Earth* states that all geological features are explainable by observing changes over time. [Thanks to Doug Faires]

1856 Lewis Carroll took his first photo of Alice Liddel.

1888 "Casey at the Bat" was published in the *San Francisco Examiner*. There is no more mathematics here than 1–2–3 and a "leather-covered sphere," but this great comic poem is known to all. For a full history see *The Annotated Casey at the Bat* (1967), by Martin Gardner, whom we know best for his writings about mathematics.

1965 Edward H. White II was the first American to perform an extravehicular activity in space, during the flight of *Gemini 4*.

1971 Death of the topologist Heinz Hopf.

1984 Teacher's Day in Massachusetts (First Sunday in May).

## 4 June

780 B.C. First reliable record of a total solar eclipse is made, China. See 6 April 648 B.C., and 13 October 2128 B.C.

1734 The *Dublin Journal* advertised as "just published" bishop-elect George Berkeley's *The Analyst or a Discourse Addressed to an Infidel Mathematician*, a work sharply critical of the foundations of the calculus. It had the positive effect of making mathematicians think about how to justify their work. [*Works of George Berkeley*, IV, 55]

1783 The brothers Montgolfier made their first public attempt to rise in a balloon at the marketplace in Annonay, near Lyons. In September, Euler, who was then 76, succeeded in integrating the difficult differential equations governing the motion of the balloon. In the course of the work he suffered several spells of dizziness; he died September 18, 1783. See November 21, 1783. [Tietze, 290]

1784 Marie Thible became the first woman to fly in a free balloon. [Chase]

1874 Mathematician William Kingdom Clifford elected to the Royal Society of London. He was one of the best known English scientists of his day because of his popular writings. [p. 16 of *A Guide to Francis Galton's English Men of Science*, by Victor L. Hilts, *Transactions of the American Philosophical Society, volume 65, part 5, 1975*]

1919 Emmy Noether received the right to teach at Göttingen. [Dick]

1925 "No one shall expel us from the paradise which Cantor created for us," said David Hilbert in an address to the Westphalian Mathematical Society in Munster in honor of Karl Weierstrass. [Benacerraf and Putnam, *Philosophy of Mathematics*; Van Heijenoort, 376 and 367; and Big Kline, 1003]

1946 Ernst Lindelöf died.

1966 To commemorate the 300th anniversary of the Académie des Sciences, France issued a stamp picturing Bernard Le Bovier de Fontenelle and the 1666 meeting room of the Académie. [Scott #1159].

1982 Hungary issued a stamp picturing Rubik's cube to celebrate the beginning of the First Rubik's Cube World Championship, which began in Budapest the next day. [Scott #2752].

## 5 June

1661 Newton admitted to Trinity College.

1716 Roger Cotes died at age 33 of a violent fever. Sir Isaac Newton, speaking of Mr. Cotes, said, "If he had lived we might have known something." See Ronald Gowing's *Roger Cotes, Natural Philosopher*, pp. 136 and 142.

1819 John Couch Adams born. In 1878 he published his calculation of Euler's constant to 263 decimal places. [DSB 1, 54]

1833 Ada first meets Charles Babbage.

1873 The term "radian" first appeared in print when James Thomson, brother of Lord Kelvin, used it in examination questions at Queen's College, Belfast. See Cajori, *History of Mathematics*, 1924 edition, p. 484.

1883 John Maynard Keynes born. In one logic class of Whitehead he was the only student. Keynes worked on the foundations of probability.

1888 Birthdate of Gregor Michailowitch Fichtenholz, who was the founder of the Leningrad school of function theory.

1933 Headlines in the *Harvard Crimson* read "Crimson Bow to West Pointer Mathematicians" and "Harvard Mathematics Team Outfigured by West Pointers." The eighth place finisher was

Herbert Robbins of Harvard. Later he said "Back at Harvard we found out, to our shame, that we lost the competition to Army."

1943 Contract signed to develop ENIAC with the Moore School at the University of Pennsylvania.

1965 The algebraist Tadasi Nakayama died.

## 6 June

1436 Birthdate of Johann Müller, who is known to us as Johannes Regiomontanus. He is the founder of trigonometry as an independent science. He was the creator of the law of sines.

1791 Savart born.

1842 Henry Martyn Taylor born in Bristol, England.

1857 Aleksandr Mikhailovich Lyapunov born in Yaroslavl, Russia. He was the creator of the modern theory of stability of differential equations especially as applied to mechanical systems. He also proved the Central Limit Theorem under weaker hypotheses than his predecessors.

1906 Max Zorn born. To his chagrin, he is most famous for discovering something yellow and equivalent to the Axiom of Choice.

1928 Luigi Bianchi died. He did fundamental work on Lie groups.

1943 Guido Fubini died. He is best known for a theorem on the exchange of order of integration.

1984 Sweden issued a series of stamps celebrating the centenary of their Patent System. One shows a tetrahedron container patented in 1948. [Scott #1501].

## 7 June

1753 The British Parliament received the royal assent for the act enabling purchase of the library (over 50,000 books and 3,500 bound manuscripts) and collection of Sir Hans Sloane, thereby founding the British Museum. [DSB 12, 459].

1863 American mathematician Edward Burr Van Vleck born.

1890 Werner Schmeidler born. He worked in analysis and applied mathematics.

1896 Robert Sunderson Mulliken born. [Thanks to Doug Faires]

1954 Alan Turing died by committing suicide because he was persecuted by the British Government for his homosexuality.

1958 France issued a stamp with a portrait of Denis Diderot (1713–1784). [Scott #B 323].

2004 The next transit of Venus over the sun, approximately 9 a.m. EST. Next after that is June 9, 2012.

## 8 June

1594 Shakespeare had the midsummer night's dream on which his play is based. See *Notes and Queries*, 27 (August 1980), pp. 162–165.

1625 French astronomer Jean Dominique Cassini born.

1637 The printing of Descartes' *Discours de la Methode*, with its important appendix "La Géométrie," was completed. See the Smith and Latham translation, p. 243.

1724 Euler received his master's degree in philosophy at age 17, giving a lecture comparing the philosophical ideas of Descartes and Newton. His bachelor's speech, in the summer of 1722, was "On temperance." [DSB 4, 468]

1858 Charlotte Agnas Scott born in Lincoln, England. She attended Girton, the first (1869) college in England for women. In 1880 she took the tripos exam at Cambridge, but because she was a woman, her name could not be announced at the award ceremony. "The man read out the names and when he came to 'eithth,' before he could say the name, all the undergraduates called out 'Scott of Girton,' and cheered tremendously, shouting her name over and over again with tremendous cheers and waving of hats." [*Women of Mathematics. A Biobibliographic Sourcebook* (1987), edited by Louise S. Grinstein and Paul J. Campbell]

1948 Carl Savit, a graduate student at Caltech, appeared in court to demand $1000 from Mottant Company of Chicago for solving the three classical construction problems. This offer was made in an advertisement that neglected to require that compass and straightedge be used. It is not known if he collected. [*Mathematics Magazine* 61 (1988), p 158].

1979 The Source, the first computer public information service, goes on line.

## 9 June

1798 Napoleon's fleet of 500 ships arrived in Malta, and three days later they captured the place. Monge started fifteen elementary schools and one high school there. [Thanks to Howard Eves]

1885 John Edensor Littlewood born. *Littlewood's Miscellany* (1986) is a delightful little book, for it shows a mathematician having fun.

1979 William Safire's column "On Language" in *The New York Times* deals with the phrase "A number of."

1984 The 50$^{\text{th}}$ anniversary of Donald Duck.

## 10 June

 940 Abu'l-Wafa born. He worked with a rusty compass.

1827 William Rowan Hamilton, age 21, appointed astronomer royal at Dunsink Observatory and Andrews professor of astronomy at Trinity College, Ireland. This was a unique event in that he was still an undergraduate. [DSB, 6, 86; Bell, *Men of Mathematics*, 346]

1832 Nikolaus August Otto born. He developed the internal combustion engine. [Thanks to Doug Faires]

1836 André-Marie Ampère died. [Thanks to Doug Faires]

1854 Riemann lectured on his Habilitationsschrift on the foundations of geometry to the aged Gauss. [Smith, *Source Book*, p. 411]

1903 The Italian geometer Luigi Cremona died.

1977 The first Apple II computer was delivered.

## 11 June

1292 Roger Bacon died.

1859 Gold discovered in Nevada.

1862 Birthdate of Lothar Heffter. At the age of 99 he published the second edition of his *Begründung der Funktionentheorie*.

1937 David Bryant Mumford born in Worth, Sussex, England. In 1974 he won a Fields Medal for his work on "problems of the existence and structure of varieties of moduli, varieties whose points parameterize isomorhphism clases of some type of geometric object." [*International Mathematical Congresses. An Illustrated History, 1893–1986*, edited by Donald J. Albers, G. L. Alexanderson and Constance Reid]

1955 France issued a postage stamp with a portrait of Pierre Simon de Laplace (1749–1827). [Scott #B298].

## 12 June

1577 Paul Guldin born.

1689 Although they had corresponded, through Oldenburg, about optics sixteen years earlier (much to Newton's grief), Newton first met Christiaan Huygens at a Royal Society meeting in London. [Newton, *Mathematical Papers*, 6, xxiii]

1888 Zygmunt Janiszewski, the father of Polish mathematics, born.

1973 Germany issued a postage stamp picturing a model of the calculator built by Wilhelm Schickard of the University of Tübingen 350 years ago. [Scott #1123].

1979 Bryan Allen, age 26, of the U.S. pedaled the *Gossamer Albatross* on the first human powered flight across the English channel. This 21 mile flight won him a £100,000 prize offered by British industrialist Henry Kremer. Two years earlier Allen was the first to fly an aircraft around a one-mile figure eight course under human power alone. See "Human-powered flight," *Scientific American*, November 1985, p. 144.

## 13 June

1676 Newton sent Oldenburg the "Epistola prior" for transmission to Leibniz. Among other things it contained the first statement of the binomial theorem for negative and fractional exponents. [DSB 10, 46]

1771 Lagrange presented, to the Berlin Academy, the first proof of Wilson's theorem ($n$ is prime iff $n$ divides $(n-1)! + 1$). Edward Waring published the theorem in 1770, but Leibniz knew it previously . See DSB 7, 565 and DSB 14, 438.

1831 James Clerk Maxwell born.

1865 Only three months before his death, Sir William Rowan Hamilton received a letter from the American astronomer, Benjamin Gould, informing him that the newly created U.S. National Academy of Sciences had elected him first on its list of Foreign Associates, thereby signifying that the academy considered him the greatest living scientist. [T. L. Hawkins, *Hamilton*, p. xv]

1871 Ernst Steinitz born. In 1910 he gave a general abstract definition of a field. He is responsible for introducing a number of concepts into the Theory of Fields, including prime subfields, separable elements, and perfect fields.

1876 William S. Gosset born. This statistician published under the name "student."

1878 Thomas Craig received his Ph.D. at The Johns Hopkins University under the direction of J. J. Sylvester for a dissertation on "The representation of one surface upon another; and on some points in the theory of the curvature of surfaces." He was one of the four to receive his degree then (the philosopher Josiah Royce was another). These were the first Ph.D.s offered by Hopkins, a university founded in 1876 to advance graduate education. See Francesco Cordasco, *Daniel Coit Gilman and the Protean Ph.D.*, 1960, p. 89.

1959 France issued a stamp picturing Jean Le Rond d'Alembert, books and wheele. [Scott #B332].

1983 *Pioneer 10*, launched 3 March 1972, leaves the solar system, being the first man-made object to do so. It has traveled over three billion miles.

## 14 June

1649 John Wallis (1616–1703) appointed Savilian professor of geometry at Oxford. This came as a surprise to many for the theologian's only previous accomplishment in mathematics was his skill at deciphering captured coded letters for Parliamentarians. Within a few years he became one of the leading mathematicians of the time. [DSB 14, 147]

1746 Colin MacLaurin organized the defence of Edinburgh, Scotland, during the Jacobite rebellion. Due to the exertion and exposure he ruined his health and died on this date of oedema. For the previous twenty years his main work was on fluxions, although he was a popular lecturer on many subjects at the University of Edinburgh.

1777 The stars and stripes adopted by the Continental Congress.

1822 Charles Babbage read a paper to the Astronomical Society of London entitled "Note on the application of machinery to the computation of astronomical and mathematical tables." He announced the successful completion of a "Difference engine," the forerunner of our modern computers. See Dubbey, *The Mathematical Work of Charles Babbage*, p. 175.

1856 Andrei Andreevich Markov born in Ryazan, Russia. He is best known for the "Markov chains" that he introduced into probability.

1868 Karl Petr born. He worked in analytic number theory, algebraic equations, and invariant theory.

1917 Alte Selberg born in Langesund, Norway. In 1950 he won a Fields Medal because he "Developed

generalizations of the sieve methods of Viggo Brun; achieved major results on zeros of the Riemann zeta function; gave an elementary proof of the prime number theorem (with P. Erdős), with a generalization to prime numbers in an arbitrary arithmetic progresion." [*International Mathematical Congresses. An Illustrated History, 1893–1986*, edited by Donald J. Albers, G. L. Alexanderson and Constance Reid]

1946 Federigo Enriques died in Rome. He worked in algebraic geometry and foundations of geometry. [DSB 4, 373].

1951 UNIVAC I, the first commercial electronic computer, was demonstrated and dedicated at the U.S. Bureau of the Census at Philadelphia. It could accept information from magnetic tape at the rate of 10,000 characters per second, yet could retain a maximum of 1000 numbers. [Kane, p. 190]

1957 Germany issued a stamp commemorating the 500th anniversary of the founding of Freiburg University. [Scott #766].

## 15 June

1752 Benjamin Franklin demonstrated electricity by means of a kite. [Kane, p. 354]

1894 Algebraist Nikolai Tschebotarjow born.

## 16 June

1686 B.C. Hammurabi the Great died after a 42-year reign in Babylon.

1799 Gauss awarded his Ph.D. at age 22, the usual requirement of an oral exam being dropped. His dissertation gave the first correct proof of the fundamental theorem of algebra. [Buhler, *Gauss*, p. 40; Eves, *Squared*, 202° has July 16]

1801 Julius Plücker born in Elberfeld, Germany. He was a geometer who worked in analytic and projective geometry, and on the theory of plane curves.

1830 Alfred Enneper born. He worked on elliptic functions and differential geometry.

1833 Janos Bolyai was retired as Captain in the cavalry for dueling with thirteen other officers. He accepted their challenge on the condition that he be allowed to play his violin between duels. [Bonola, *Non-Euclidean Geometry*, Appendix 1, p. xxix]

1854 For the first time in more than twenty years, Gauss left Göttingen. He went to see the railway between between Cassel and Göttingen that was under construction. [Thanks to Howard Eves]

1897 Alaska gold rush.

1902 Bertrand Russell wrote Gottlob Frege that in his *Grundgesetze der Arithmetik* "there is just one point where I have encountered a difficulty." The difficulty is the Russell Antinomy, a logical contradiction. See 22 June 1902.

1910 Differential geometer Julius Weingartnen died. He worked on differential geometry.

1947 ENIAC patent filed.

1963 Valentina Tereshkova became the first woman in space. She was aboard the Soviet Union's *Vostok 6*. See 18 June 1983.

1973 Afghanistan issued a postage stamp commemorating the millennium of the birth of Abū Rayḥān Muḥammad ibn Aḥmad Al-Bīrūnī (born 4 September 973, died after 1050), author of books on arithmetic, geometry, trigonometry, astronomy and geography. [Scott #881].

## 17 June

1867 Nobel invented dynamite. It is from this invention that he earned the fortune that he used to endow the Nobel Prizes.

1903 Sir. William Valance Douglas Hodge born.

1908 Gunnar Af Hällström born. He determined the congruence axioms which Hilbert used in his famous axiomatization of geometry.

## 18 June

1558 Robert Recorde's will was admitted to probate, after he died in prison. He introduced the equals sign in *The Whetstone of Witte* (1557) with the words: "And to avoide the tediouse repetition of these woordes: is equalle to: I will sette as I doe often in woorke use, a pair of paralleles, or Gemowe lines of one lenghte, thus: ========, because noe .2. thynges, can be moare equalle." "Gemowe" is an old French work meaning "twin." See DSB 11, 338.

1584 Jacob Christmann appointed professor of Hebrew at Heidelberg. In 1595 he defended the view that the circle could only be approximately squared. [DSB 3, 262].

1815 The Battle of Waterloo. [Thanks to Howard Eves]

1858 Andrew Russell Forsyth born in Glasgow, Scotland.

1864 Lewis Carroll finally decided to write up *Alice's Adventures in Wonderland*. [Stuart Dodgson Collingwook, *The Life and Letters of Lewis Carroll* (1898), p. 96]

1935 Alexander von Brill died. He worked on algebraic geometry and the theory of algebraic functions.

1980 Kuratowski died.

1983 Sally Ride, astrophysicist, becomes the first American woman in space. The Soviets were ahead by twenty years and two days.

## 19 June

240 B.C. Eratosthenes estimates circumference of the earth.

325 The early Christian church opened the council of Nicaea, which decided the rules for computing the date of Easter: The first Sunday after the first full moon on or after the vernal equinox.

1623 Blaise Pascal born in Ferrand, Auvergne, France.

1771 Joseph Gergonne born. He liked to season his papers with philosophical remarks. In one he wrote "It is not possible to feel satisfied at having said the last word about some theory as long as it cannot be explained in a few words to any passerby encountered in the street." [DSB 5, 368]

1851 Silvanus P. Thomson born. In 1910 he published *Calculus Made Easy*, which was published anonymously until after his death in 1916. It is still in print. [DSB 13, 357]

1885 The Statue of Liberty arrived.

1910 Deutschland, the first Zeppelin, launched.

1945 Stefan Mazurkiewicz, one of the founders of *Fundamenta Mathematicae*, died.

## 20 June

1688 Newton, in a letter to Edmund Halley, again expresses his exasperation with carping critics. [Thanks to Howard Eves]

1782 Great seal of the U.S. adopted

1788 "The science of figures, to a certain degree, is not only indispensably requisite in every walk of civilized life, but the investigation of mathematical truths accustoms the mind to method and correctness in reasoning, and is an employment peculiarly worthy of rational beings." George Washington, thanking Nicholas Pike for the gift of his *Systems of Arithmetic*. See *MT* 47(1954), 409.

1808 Poisson submitted his first paper on the stability of the planetary system, one day before his twenty-seventh birthday. See Ivor Grattan-Guiness, *Convolutions in French Mathematics, 1800–1840*, p. 373.

1873 Alfred Loewy born. He worked in group theory and differential equations.

1877 Georg Cantor, in a letter to Dedekind, announced a proof that the points inside a square are in one-to-one correspondence with those on a line segment. Three years earlier, Cantor had

intimated that this was clearly impossible. [DSB 3, 54; Thanks to David Kullman]

1984 The First International Conference on Computers began in Beijing, China.

## 21 June

1781 Siméon-Denis Poisson born in Pithiviers, France (died 1840). He worked in many areas of mathematics, including differential equations and celestial mechanics. Libri wrote of him: "His only passion has been science: he lived and is dead for it." [Ivor Grattan-Guiness, *Convolutions in French Mathematics, 1800–1840*, p. 189]

1852 Eduard Weyr born (died 1903). He and his brother, Emil Weyr (1848–1894) were the leading members of the Austrian geometrical school. They worked in descriptive geometry, projective geometry, and then became interested in algebraic and synthetic methods. Eduard found a canonical form for matrices that deserves to be better known (*American Mathematical Monthly*, December 1999).

1918 Algebraist Tibor Szele born (died 1955). He worked in group theory.

1929 Kazimierz Kuratowski (1896–1980) at a meeting of the Warsaw Section of the Polish Mathematical Society, announced that a graph is planar iff it does not contain a subgraph homeomorphic to either $K$–5, the complete graph on 5 points, or $K$–3–3, the complete bipartite graph on two sets of three points. See *HM* 12, 258, for a discussion of the early history of this theorem which is now the most cited result in graph theory.

1976 Kenneth Appel and Wolfgang Haken announced that with the aid of a computer that they had proved the four color problem. Because of the use of the computer the solution was not quickly accepted by all, but today most mathematicians accept the proof as correct. However, no simple proof is known as yet.

## 22 June

1389 Giovanni Dondi died. In 1381 he built one of the earliest geared equatoria driven by clockwork. There is a model of it in the Smithsonian. It has a heptagonal frame with a planet on each face. Dials show the time of sunrise, sunset, movable feasts, and the nodes of the moon's orbit. [DSB 4, 164]

1633 Galileo, under threat of torture from the inquisition, was forced to recant Copernicanism. [Eves, *Circles*, 156°]

1799 France adopted the metric system of weights and measures. [Eves, *Revisted*, 90°]

1837 Paul Gustav Heinrich Bachmann born. He wrote (1892–1923) a five volume survey of the state of number theory including an evaluation of the various methods of proof. He also devoted time to composing, playing the piano, and serving as a music critic for various newspapers. [DSB 1, 390]

1864 Herman Minkowski born. The motto on his Akademie-Schrift was "Rien n'est beau que le vrai, le vrai seul est aimable" (Nothing is beautiful but the truth, only the truth is lovable).

1880 Alfred Rosenblatt born. He worked in analysis and probability theory.

1902 To a letter from Bertrand Russell dated 16 June 1902, Gottlob Frege responded with characteristic scientific honesty that "your discovery of the contradiction caused me the greatest surprise and, I would almost say, consternation, since it has shaken the basis on which I intended to build arithmetic." [van Heijenoort, *From Frege to Gödel*, 125–128]

1910 Birthdate of Konrad Zuse, inventor of the first fully functional programmable digital computer.

1925 Felix Klein died. Curiously, this was the birthday of his dear friend Minkowski.

1936 Moritz Schlick, philosopher of science and leader of the Vienna Circle, was murdered by a deranged former student, on the steps of an academic building. [DSB 12, 177]

1978 Christy discovers Pluto's satellite, Charon.

1988 The *New York Times* Week in Review section carried a story with the headline "A School of

Theorists Works Itself Out of a Job," which reported that group-theorists had almost completed the classification of finite simple groups. The classification was completed when Griess proved the existence of "The Monster" group of size about $10^{54}$, but fears about the death of group theory were unfounded. [P. 13 of Franklin 1987]. Clarify this reference.

## 23 June

1585 Thomas Harriot arrived off the coast of Virginia (actually Cape Lookout, NC). He was the first substantial mathematician to visit North America. [John W. Shirley in *Thomas Harriot: A Biography*, 1983, p. 129; Thanks to Kullman]

1676 Newton, via Oldenburg, sent his famous *Epistola prior* to Leibniz. It contained the first use of fractional exponents as well as the newly discovered binomial theorem. See DSB 10, 254.

1892 Pierre Ossian Bonnet died. He worked on minimal surfaces, geodesics, and integral geometry.

1912 Alan Mathison Turing born. This British mathematician was one of the founders of recursion theory, invented the Turing machine (an abstract model of a computer), did important work in cryptography, and invented the computer. See *Alan Turing. The Enigma* by Andrew Hodges, 1983.

## 24 June

1497 American mainland discovered by Columbus.

1634 Gilles Personne de Roberval was proclaimed the winner of the triennial competition for the Ramus chair at the Collège Royal in Paris. Thereafter, he kept his mathematical discoveries secret so that he could continue to win the competition and keep the chair. As a consequence he lost credit for many of his discoveries. [DSB 11, 486]

1687 In a letter to Huygens, Fatio de Dullier used an integrating factor to solve the differential equation $3x\,dy - 2y\,dx = 0$. No earlier instance of an integrating factor is known. The fundamental conception of integrating factors was due to Euler (1734) and further developed by Clairaut (1739). [Ince, *Ordinary Differential Equations* (1926), 531 and 534]

1880 American geometer and topologist, Oswald Veblen born in Decorah, Iowa. His father was a physicist and his uncle was the political economist Thorsten Veblen.

1947 Kenneth Arnold of Boise, Idaho, saw a mysterious flying object over Mt. Rainier, Washington. He was the first person to report the sighting of a flying saucer. Since then, more than 13,000 UFO sightings have been reported in the U.S. alone.

1957 Germany issued a stamp commemorating the 500$^{\text{th}}$ anniversary of the founding of Freiburg University. [Scott #766].

1968 Rumania issued a stamp honoring the mathematician Ion Ionescu de la Brad (1818–1891), whoever he was. [*Journal of Recreational Mathematics*, 2(1969), 50; Scott #2012]

## 25 June

1712 Brook Taylor suggested that if two glass plates which are clamped together into a "V" are placed into a pan of water then capillary action will draw water up into the shape of a rectangular hyperbola with asymptotes the surface of the water and the point of the "V." This and several similar experiments performed by Francis Hauksbee before the Royal Society caused Newton to rethink his ideas on capillary force. [DSB 6, 173]

1795 Founding of the Bureau of Longitude in Paris. [DSB 7, 569]

1892 Japanese analyst Yoshitomo Okada born.

1941 Alfred Pringsheim died. His work in Fourier series, analytic function theory, and continued fractions was a model of the Weierstrassian approach, although he was not a student of Weierstrass.

## 26 June

1498 The toothbrush was invented in China.

1824 William Thomson, Lord Kelvin, Scottish physicist, born.

1984 Meridian Day celebrates the centennial of the adoption of the Greenwich meridian as the prime meridian on which the world's time zones are based. [History of Science Society *Newsletter*, April 1984] Is it always on this date?

## 27 June

432 B.C. Meton observed the summer solstice and began his cycle. [DSB 9, 337] Woops. See 16 July.

1806 Augustus de Morgan born in Madura (now Madurai), India, son of a colonel in the Indian Army. He is best known for his work in Formal Logic. "De Morgan's Laws", are contained in his first book (1847), although they were known to Peter of Spain in the fourteenth century.

1831 Sophie Germain died before she could receive the honorary doctorate Gauss had persuaded the University of Göttingen to give her. [*Women of Mathematics. A Biobibliographic Sourcebook* (1987), edited by Louise S. Grinstein and Paul J. Campbell; Thanks to Gerald Lenz]

1850 Birthdate of the Danish mathematician Jorgen Pedersen Gram. Today he is best known for his criterion of linear independence of functions. The Gram-Schmidt Orthonormal Basis Theorem in Linear Algebra was first published by him in 1883. See John B. Fraleigh and Raymond A. Beauregard, *Linear Algebra* (1987), p. 279.

1906 Philip Jourdain, logician, sent Bertrand Russell a copy of his newly published anonymous *Topsy-turvey fairy tales by somebody-or-other, with three illustrations by somebody-else.* The last tale contains a version of the Russell antinomy. [P. 90 of *Dear Russell-Dear Jourdain*, edited by I. Grattan-Guinness]

1908 The academy of sciences of Göttingen announced a prize of one hundred thousand marks, according to the will of Dr. Paul Wolfskehl, of Darmstadt, for the proof of Fermat's great theorem. [*BAMS* 15, 44]

1940 Daniel G. Quillen bon in Orange, New Jersey. In 1978 he won a Fields Medal as the "prime architect of the higher algebraic $K$-theory, a new tool that successfully employed geometric and topological methods and ideas to formulate and solve major problems in algebra, particularly ring theory and module theory." [*International Mathematical Congresses. An Illustrated History, 1893–1986*, edited by Donald J. Albers, G. L. Alexanderson and Constance Reid]

1952 Max Dehn died. He solved Hilbert's third problem in 1900 (shortly after receiving his Ph.D. under Hilbert on another topic in the foundations of geometry): a tetrahedron cannot be cut up into finitely many pieces and reassembled into a cube of equal volume. Thus Dehn became the first mathematician to join "the honors class" of mathematicians who had solved one of the twenty-three problems Hilbert posed in Paris in 1900.

1977 Italy issued a postage stamp honoring Filippo Brunelleschi (1377–1446). [Scott #1266].

1980 Creighton Carvello recited 20,013 digits of $\pi$ from memory in nine hours and one minute.

1980 *Science* (pp. 1442–1443) reported that the U. S. National Security Agency is trying to find a means of preventing publications of research on cryptographic research. This was in response to the publication of public-key cryptosystems. [*Mathematics Magazine* 53 (1980), p 253].

## 28 June

1751 The first volume of Diderot's and d'Alembert's *Encyclopédie* appeared. See Hawkins, *Jean d'Alembert*, p. 69.

1830 The French Academy of Sciences awarded its Grand Prix to Abel (posthumously) and Jacobi for their outstanding work on elliptic functions. [DSB 1, 17]

1875 Henri Lebesgue born. He introduced the concept of Lebesgue Measure, a device for measuring the 'length' of complicated sets of points on the line, and so is known as the father of modern integration theory.

1884 Sonya Kovalevskaya officially appointed extraordinary professor at Stockholm University. [*The Mathematical Intelligencer*, vol. 6, no. 1, p. 29; Thanks to Gerald Lenz]

1894 Einar Hille born. In the preface of his *Analytic Function Theory* (1959) he wrote "It is my hope that students of this book may come to respect the historical continuity of the subject." More authors should include historical footnotes as good as those in this book.

1956 Functional analyst Friedrich Riesz died.

## 29 June

1869 George Ellery Hale born. [Thanks to Doug Faires]

1877 After proving that the points in a square can be put in one-to-one correspondence with the points on a line segment Cantor wrote his friend Dedekind "Je le vois, mais je ne le crois pas." (I see it, but I don't believe it.) [Dauben, *Georg Cantor*, p. 55]

1893 Birthdate of Eduard Čech, Czech topologist. [DSB 3, 170]

1904 Topologist Witold Hurewicz born.

1956 The interstate highway system was signed into law by President Eisenhower. Even (odd) numbered roads run East–West (North–South) with the numbers increasing from South to North (West to East). Roads with three digit numbers are loops around cities (when the first digit is even) or spurs (first digit odd); In either case the last two digits are the main road number.

1942 Birthdate of the American logician and theoretical linguist K. Jon Barwise.

## 30 June

1660 William Oughtred, inventor of the slide rule (1621) and a staunch royalist, died in a transport of joy on hearing the news of the restoration of Charles II. Augustus De Morgan later remarked, "It should be added, by way of excuse, that he was eighty-six years old." [Eves, *Circles*, 152° and DSB 10, 254]

1742 Christian Goldbach communicated to Euler his "theorem" that every even integer greater than two is the sum of two primes. The "Goldbach conjecture" is still open. The letter was not published until 1843. [Cajori, *History of Mathematics*, 249; Weil, *Number Theory*, says 7 June]

1880 Birthdate of Rudolf Fueter who worked with functions with non-commutative variables and also in number theory.

1908

Comet(?) explodes above Tunguska, Siberia.

1946

ENIAC formally accepted by the government.

See 2 October 1955.

1955

Sperry Rand formed.

# JULY

## 1 July

1646 Gottfried Wilhelm Leibniz born in Leipzig, Germany.

1694 o.s. Opening of the University of Halle in Germany. Georg Cantor later taught there. [Muller]

1779 John Farrar born at Lincoln, Massachusetts. As Hollis professor of mathematics and natural philosophy at Harvard, he was responsible for a sweeping modernization of the science and mathematics curriculum, including the change from Newton's to Leibniz's notation for the calculus. [DSB 4, 546].

1788 Jean Victor Poncelet born in Metz, France. He taught engineering and mechanics, but had a hobby of much greater interest—projective geometry.

1798 Napoleon's fleet reached Alexandria, bearing Monge and Fourier. [Thanks to Howard Eves]

1818 William George Horner's (1786–1837) method of solving equations is presented to the Royal Society. See DSB 6, 510 and Smith, *Source Book*, p. 232.

1847 The United States issued its first two postage stamps. They pictured Benjamin Franklin and George Washington respectively [Scott #1-2].

1852 Dirichlet delivers a memorial lecture at the Berlin Academy in honor of his close friend Jacobi, calling him the greatest member of the Academy since Lagrange. [DSB 7, 52]

1856 Weierstrass appointed Professor of Mathematics at the Royal Polytechnic School in Berlin. [Thanks to Howard Eves]

1894 The New York Mathematical Society changed its name to the American Mathematical Society to reflect its national charter. [*AMS* Semicentennial Publications, vol. 1, p. 74].

1906 Jean Dieudonné born.

1918 Florian Cajori (1859–1930) appointed professor of the history of mathematics at the University of California, Berkeley, one of the few such chairs in the the world. During the next twelve years he published 159 papers on the history of mathematics. For a list of his 286 publications see *ISIS* 17(1932), 384-407, especially p. 386.

1964 The *New York Times*, in a full page ad, announced that Paul Newman and Joanne Woodward would play a game on an elliptical pool table. It had a pocket at one focus so that if the ball passed over the other focus it would bank off the rail into the pocket. [*UMAP Journal*, 4(1983), p. 176; *Recreational Mathematics Magazine*, no. 14, January-February 1964]

## 2 July

1621 Thomas Harriot died of a cancerous ulcer on his left nostril. While in America in 1586 he learned to "drink" tobacco smoke from the Indians. This probably makes him the earliest recorded tobacco fatality. He is best known for his contributions to algebra, including the invention of the symbol for less than. He might have adopted this symbol from a decoration on an Indian's back. See C. L. Smith, "On the origin of '<' and '>'," *The Mathematics Teacher*, 57(1964), 479–481 for a picture of this Indian. [DSB 6, 124]

1622 René-Françoise de Sluse born.

1830 "It is true that Fourier is of the opinion that the principle object of mathematics is the public utility and the explanation of natural phenomena; but a scientist like him ought to know that the unique object of science is the honor of the human spirit and on this basis a question of [the theory of] numbers is worth as much as a question about the planetary system." Jacobi to Legendre. Big Kline, p. 1037.

1850 Stokes's theorem made its first appearance as a postscript to a letter from Sir William Thompson (Lord Kelvin) to Stokes. It first appeared publicly as question 8 on the Smith's Prize exam for 1854. Stokes drew up this competitive exam, which was taken by the best mathematics students at Cambridge University. By the time Stokes died the theorem was universally known as "Stokes's theorem." [Spivak, *Calculus on Manifolds*, p. viii].

1852 Birthdate of William Burnside, whose *Theory of Groups* (1897, 1911) is now a classic. His suspicion that every group of odd order is solvable was proved in 1962 by Walter Feit and John G. Thompson. For a photograph of Feit and Thompson see *The American Mathematical Monthly* 91(1984), p. 18. [DSB 2, 615].

1982 *Science* (p. 39) reported that Steven Smale had proved that the average-case behavior of the simplex algorithm for linear programming is far better than the worse-case behavior, which is exponential. [*Mathematics Magazine* 56 (1983), p. 55].

## 3 July

1798 Jakob Bernoulli II died.

1822 Charles Babbage described his ideas for a "difference engine" to the Royal Society.

1897 Jesse Douglas born in New York City. He did important work on Plateau's problem, which asks for the minimal surface connecting a given boundry. For this work he received a Fields medal in 1936, the first time that they were given. For his picture see *International Mathematical Congresses. An Illustrated History, 1893–1986*, edited by Donald J. Albers, G. L. Alexanderson and Constance Reid.

## 4 July

1045 The Crab Nebula supernova is recorded in China and Japan.

1662 "By and by comes Mr. Cooper ... of whom I entend to learn Mathematiques; and so begin with him today .... After an hour's being with him at Arithmetique, my first attempt being to learn the Multiplication table, then we parted till tomorrow." Samuel Pepys, in his diary. At the time he was something like a modern Secretary of the Navy. [AMM 91(1984), p. 52]

1742 Guido Grandi died. He corresponded with Leibniz on the sum of the series $1 - 1 + 1 - 1 + 1 - \cdots$.

1744 Euler wrote Christian Goldbach that he has finished his book *Introductio in analysin infinitorum* (Lausanne 1748). In this work the trigonometric and logarithmic functions were first treated in their modern form. [*MR* 85d:01030].

1826 Thomas Jefferson died and was buried at Monticello. He wrote his own epitaph: "Here was buried Thomas Jefferson, author of the Declaration of Independence, of the statute of Virginia for religious freedom, and father of the University of Virginia."

1843 Liouville began an address to the Academy of Sciences with the words: "I hope to interest the Academy in announcing [that in] the papers of Evariste Galois I have found a solution, as precise as it is profound, of this beautiful problem: whether or not it [the general equation of fifth degree] is solvable by radicals." This work of Galois was published in 1846. [Burton, *History of Mathematics*, p. 322].

1862 Charles Lutwidge Dodgson, mathematics teacher at Oxford, went boating on the Isis, a tributary of the Thames, with the three daughters of Henry George Liddell, dean of Christ Church, Oxford. He was especially fond of Alice Liddell, then ten, and it was mainly for her that he began the story of another Alice's tumble down a rabbit hole. The work was published exactly three years later as *Alice's Adventures under Ground* under the pseudonym Lewis Carroll, with the famous illustrations by John Tenniel. This work is a favorite of mathematicians, so if you haven't read it recently, you should. See 26 November 1864.

1942 The destroyer escort USS Pope "Rolled her first depth charge—for fun." When she was decommissioned later that fall, yeoman Martin Gardner wrote a poem "So Long Old Girl" that relates his shipboard experiences. Previously, while working at the University of Chicago's press relations office, he learned that Enrico Fermi had been working on nuclear reactions. Thus when the bombing of Hiroshima was announced over the ships' intercom, he alone on the ship knew the significance—World War II was over,

> And the ship is about as much use in the next war
> As a paper ship in the bathtub.

See *The No-Sided Professor* (1987), pp. 21–25 for the text of this interesting, but rather bad, poem.

1945 John Poulos born in Denver, Colorado. Currently a professor at Temple University, he is the author of the popular book *Innumeracy*.

1963 The *San Francisco Chronicle* carried a report entitled, "A Milestone in Math—Professor's New Concept," by David Perlman. This popular account of Paul J. Cohen's proof of the independence of the axiom of choice was probably the first published. [JSL 28(1963), p. 295]

2000 Independence Day. Can you compute what day of the week it will be?

## 5 July

1687 Halley wrote to Newton that his *Principia* was finally published. [Westfall, p. 468]

1698 Johann Bernoulli, in a letter to Leibniz, defined the notion of a function. The term "function" is due to Leibniz. [Cajori, *Historical Introduction to the Mathematical Literature*, p. 96]

1853 Cecil Rhodes, statesman, born.

1865 Oskar Bolza born.

1932 René Louis Baire died.

## 6 July

1476 Regiomontanus, the father of trigonometry as a science independent of astronomy, poisoned by the sons of a man that he wrote a polemic against. [Muller]

1785 The Continental Congress adopted the decimal system of money with the dollar as unit. [Kane, p. 395]

## 7 July

1747 Johann Sebastian Bach dedicated his *Musikalisches Opfer* (Musical Offering) to Frederick the Great. For a discussion of the mathematical significance of this cerebral music, see *Gödel, Escher, Bach: An Eternal Golden Braid* by Douglas R. Hofstadter.

1752 Joseph-Marie Jacquard born.

1823 William Rowan Hamilton passed into Trinity College, Dublin. He was easily first out of the 100 candidates. [Thanks to Howard Eves]

1847 Lassel discovered a satellite of Neptune. [Muller]

1887 Michelson and Morley begin interferometer experiment to try to detect ether.

1906 Birthdate of the probabilist William Feller. He once said that multiplication, especially before breakfast, is seldom commutative. He died in 1970.

1927 Magnus Gustaf Mittag-Leffler died.

## 8 July

1390 Albert of Saxony died. He wrote an excellent logic text and published two works on squaring the circle. [DSB 1, 94]

1476 Johannes Regiomontanus died.

1661 Newton matriculates at Cambridge. [Westfall, 1 and 67]

1695 Christiaan Huygens died.

1835 Liberty bell cracked.

1857 Birthdate of Alfred Binet who introduced his famous IQ test in 1905.

1933 Jansky announced detection of radio radiation from galactic center.

## 9 July

1814 Gauss made the 146th and last entry in his scientific diary. He observed a connection between biquadradic residues and the lemniscate functions. This has become the most famous entry

in the diary as it led to the Weil conjectures. See Gray, *Expositions Mathematicae*, 2(1984), 97–130.

1845 Birthdate of George Howard Darwin, fifth child of the evolutionist Charles Darwin. After graduating second wrangler and Smith's prizeman at Cambridge in 1866 he studied law before settling down to his life work in mathematical astronomy. He addressed the Fifth International Congress of Mathematicians at Cambridge in 1912 on his work on the three body problem. [DSB 3, 583]

1857 Weierstrass, in his inaugural speech at the Berlin Academy, stated that mathematics occupies an especially high place because only through its aid can a truly satisfying understanding of natural phenomena be obtained. [DSB 14, 221]

1870 Weather bureau authorized.

1915 Kenneth O. May born. See *HM* 11, 359–393 for an obituary, bibliography and photograph of this historian of mathematics.

1953 France issued a stamp picturing Gaspard Monge. [Scott #279].

1984 Edna Ernestine Kramer Lassar died of pneumonia at her home in Manhattan. She graduated *magna cum laude* from Hunter College and earned a Ph.D. at Columbia in 1930. She is best known for her book *The Nature and Growth of Modern Mathematics*, which is an excellent exposition of much of modern mathematics. It is very accessible to undergraduates. For more about her, see *Women of Mathematics. A Biobibliographic Sourcebook* (1987), edited by Louise S. Grinstein and Paul J. Campbell.

## 10 July

1637 First meeting of the *Académie Française*. [Muller]

1682 Roger Cotes born. In January 1706 he was named the first Plumian professor of astronomy and natural philosophy at Cambridge. It was Cotes who first showed that $e$ was the natural base to choose for the logarithm. [DSB 3, 430]

1796 Date of the entry

$$\text{E}\gamma\text{PHKA!}\quad \text{num} = \Delta + \Delta + \Delta$$

in Gauss's scientific diary, recording his discovery that every positive integer is the sum of three triangular numbers. [Thanks to Howard Eves]

1826 Cauchy presented a proof to the *Académie* dealing with existence theorems for first-order differential equations. [Ivor Grattan-Guiness, *Convolutions in French Mathematics, 1800–1840*, pp. 758 and 1401]

1843 Jacques Philippe Marie Binet, age 57, elected to the *Académie des Sciences* to succeed Lacroix. He is an example of a mathematician who published much late in life. He worked in mechanics, elasticity, perturbation theory, determinants, and the calculus. [Ivor Grattan-Guiness, *Convolutions in French Mathematics, 1800–1840*, pp. 191 and 1410]

1925 The "Monkey Trial" of John T. Scopes began in Dayton, Tennessee. Clarence Darrow defended him. The prosecution, conducted by William Jennings Bryan, presented a strong case, and he was convicted of violating a state law prohibiting the teaching of evolution. Although the law was later overturned, this case provided a strong blow to science education. Scopes was not a biologist and never taught evolution. Rather he was a mathematics and physics teacher who volunteered to stand trial to furnish a test case. [Eves, *Squared*, 335°]

1950 France honors Lazar Carnot (1753–1823) with a postage stamp. [Scott #B251].

1950 The German Democratic Republic, to celebrate the 250$^{\text{th}}$ anniversary of the founding of the Academy of Sciences, Berlin, issued postage stamps picturing Leonhard Euler and Gottfried von Leibniz. [Scott #58, 66].

1973 U.S. stamp "Progress in Electronics" issued honoring Walter Brattain, William Schockley and John Bardeen who received a Nobel Prize for their invention of the transistor at Bell Labs on 7 December 1948.

1976 Rumanian gymnast Nadia Comaneci received the first perfect score ever recorded in an Olympic event. The score of 10.00 was rejected by the computer as it was only programmed to accept three-digit scores.

1993 MASH fans will remember that there was always a sign telling how many miles to Toledo and frequently they talked of the hotdogs at Tony Pacos (they are good). On this date the Cake Walk and Jazz Band celebrated their twenty-fifth anniversary with a live broadcast at Tony Pacos that was broadcast on public radio in Toledo. So what does this have to do with mathematics? Well, Ray Heitger, their clarinetist, leader, and one of the founding members happens to be a math teacher. If you can't get to Toledo to hear them play, perhaps you can find one of their six LPs.

## 11 July

1663 John Wallis, Savilian Professor of Geometry at Oxford, gave a specious proof of Euclid's parallel postulate. See W. W. Rouse Ball, *Mathematical Recreations and Essays*, 6th edition, pp. 314–315.

1686 Leibniz published his first paper on the integral calculus in *Acta eruditorum.*

1700 Royal Prussian Academy of Sciences at Berlin founded. Leibniz was primarily responsible for the founding and directed it for sixteen years. [HM 2, p. 310; *American Journal of Physics*, 34(1966), p. 22]

1731 Alexis-Claude Clairaut elected to the French academy. He was only eighteen. [DSB 3, 281]

1738 Isaac Greenwood, the first Hollis Professor at Harvard, was "ejected" from his chair for drunkenness. [I. B. Cohen, *Some Early Tools of American Science*, p. 36.]

1814 Ampère submitted a paper on general solutions of differential equations. It contains thought-provoking remarks and interesting examples which had to wait several decades for proper understanding and recognition. [Ivor Grattan-Guiness, *Convolutions in French Mathematics, 1800–1840*, pp. 700ff, 1389]

1857 Sir Joseph Larmor born in Magheragall, Ireland.

1901 Astronomer and mathematician Simon Newcomb died in Washington D.C. He was such a revered scientist that President Taft attended his funeral. [DSB 10, 35]

## 12 July

1831 Gauss to Schumacher: "I protest against the use of an infinite quantity as an actual entity; this is never allowed in mathematics. The infinite is only a manner of speaking, in which one properly speaks of limits to which certain ratios can come as near as desired, while others are permitted to increase without bound." [Big Kline, p. 993]

1925 Heisenberg announced the basic principles of quantum mechanics.

1979 The Gossamer Albatross completed the first wholly man-powered flight across the English Channel. See August 23, 1971. [Air & Space]

## 13 July

1927 B.C. The eclipse of the sun mentioned in Genesis xv, 12. [Muller]

1527 John Dee born in London, England. In 1570 he wrote a "fruitfull Praeface" to the Billingsley translation of Euclid, which he edited. This was the first English Euclid. [DSB 4, 5]

1741 Birthday of Carl Friedrich Hindenburg.

1773 Gerolamo Saccheri, a Jesuit priest, received the imprimatur of the Inquisition for his *Euclides ab Omni Naevo Vindicatus* (Euclid Cleansed of Every Blemish), an important forerunner of non-Euclidean geometry. [George E. Martin, *The Foundations of Geometry and the Non-Euclidean Plane*, p. 304]

1807 Johann III Bernoulli died.

1832 Charles Babbage was the first recipient of the Royal Astronomical Society's Gold Medal. He earned it for his work "Observations on the Application of Machinery to the Computation of Numerical Tables." [Goldstein, *The Computer from Pascal to von Neumann*, p. 10.]

1936 On July 13 and 14 all that remained of Newton's papers—an estimated three million words in manuscript—were sold at auction by Sotheby's for a mere £9030.10s. and thereby literally scattered to the farthest corners of the globe. Through the efforts of the economist J. M. Keynes a significant portion was acquired for libraries in Cambridge and London, but some important scientific manuscripts have disappeared into unknown private hands. Ironically this dispersal spured interest in Newton's work. [Newton, *Mathematical Papers*, I, xxxv]

1984 Friday-the-thirteenth. There was not another until September, 1985. The intervening 13 month period is the longest one can go without suffering a Friday-the-thirteenth. See 13 January 1984.

## 14 July

1791 A mob in Birmingham, England, rioted during festivities marking the anniversary of the fall of the Bastille on this date in 1789. The mob, which ran wild for three days, destroyed the house, laboratory and library of Joseph Priestley, discoverer of oxygen, because of his antireligious views and espousal of revolutionary causes.

1793 George Green baptized in Nottingham, England. The date of his birth is unknown. His most famous work, *An Essay on the Application of Mathematical Analysis to the Theory of Electricity and Magnetism* was published, by subscription, in March 1828. Most of the fifty-two subscribers were friends and patrons. The work lay unnoticed until William Thomson rediscovered it and showed it to Liouville and Sturm in Paris in 1845. The Theory of Potential it developed led to the modern mathematical theory of electicity. [DSB 15, 199]

1827 Fresnel died.

1831 Evariste Galois again arrested, as a precautionary measure. He received a six months sentence. [Thanks to Howard Eves]

1868 Alvin J. Fellows of New Haven, Connecticut, received patent #79,965 for the first tape measure. It was enclosed in a circular case with a spring lock to hold the tape at any desired point.

1880 Lorenzo Mascheroni died.

1887 The first textbook about the international language, Esperanto, was published by its inventor, Dr. Ludwig Zamenhof, a Pole. Esperanto means "one who hopes." The Italian mathematician, Giuseppi Peano, created an international language of his own, *Latina sina flexione* (Latin without inflections), but it was even less successful than Esperanto.

## 15 July

 622 Mohammed's flight, the Hegira, from Mecca to Medina began. Traditionally, the Islamic calendar began at sunset on this day.

1662 The Royal Society of London received its charter. See 28 November 1660. [DSB 14, 510]

1848 Birthdate of Vilfredo Pareto.

1913 A window at Westminster Abbey, in memory of Lord Kelvin, was unveiled. [AMM, 20(1913), 233]

1928 The first message for transmission by the Enigma was encoded.

1930 Steven Smale born in Flint, Michigan. He earned three degrees at the University of Michigan and now teaches at Berkeley. He has made significant contibutions to topology (Fields Medal, 1966), dynamical systems, economics, and numerical analysis. This still leaves time for chess, go, sailing, collecting minerals, and lots of political activism. For an interview with this facinating mathematician, see *More Mathematical People* (1990), edited by Donald J. Albers, G. L. Alexanderson and Constance Reid.

1961 Nina Karlova Bari was hit by a train in Moscow Metro. It is unclear whether it was an accident or a suicide brought on by despondency over the death of Nikolai Nikolaevich Luzin (1883–1950),

her teacher and reported lover. See *Women of Mathematics. A Biobibliographic Sourcebook* (1987), edited by Louise S. Grinstein and Paul J. Campbell for more about her.

## 16 July

433 B.C.  The Metonic 19-year cycle of the moon enacted. This masterpiece of approximation (19 solar years = 235 lunations) is still used today in the computation of the date of Easter. [See A. Philip, *The Calendar: Its History, Structure and Improvement*, p. 8] Woops. See 27 June.

1730  The famous lines of Alexander Pope (1688–1744) which were intended as an epitaph for Newton:

> Nature and Nature's Laws lay hid in night:
> God said, *Let Newton be!* and all was light.

were published in the *Grub-Street Journal*, the first time they appeared in print. [*Scripta Mathematica*, 3(1935), 283.

1801  Birthdate of Julius Plücker, experimental physicist and geometer. He proved the principle of duality.

1828  James Ryan recorded his copyright for *The Differential and Integral Calculus*, the first calculus book written by a U.S. citizen.

1848  Exactly 50 years earlier, Gauss received his doctorate. As part of the show at the golden jubilee Gauss was to light his pipe with a manuscript page from his *Disquisitiones Arithmeticae*. His student Dirichlet was outraged by this sacrilege and boldly snatched the paper as a treasured memento. [Eves, *History of Mathematics*, p. 370]

1903  Irmgard Flügge-Lotz born in Hameln, Germany. Her father encouraged her in mathematics, but she chose engineering because "I wanted a life which would never be boring—a life in which new things would always occur." She studied applied mathematics at the Technical Unviersity of Hanover and in 1929 she became a *Doktor-Ingenieur*, the equivalent of an American Ph.D. in Engineering. She made contributions to aerodynamics, control theory, and fluid mechanics. In 1960 she became full professor at Stanford. For more details see *Women of Mathematics. A Biobibliographic Sourcebook* (1987), edited by Louise S. Grinstein and Paul J. Campbell.

1918  Birthdate of S. H. Aronhold.

1945  The first atomic bomb explosion was carried out in a test at Alamogordo Air Base in New Mexico, at 12:29:15 G.C.T. [DSB 4, 582]

## 17 July

1698  Birthdate of Pierre Louis de Maupertuis, developer of the principle of least action.

1790  Johann II Bernoulli died.

1879  It was announced in Nature that Kempe had proved the four-color conjecture. A correct proof, based on Kempe's ideas, had to wait another century. [N. L. Biggs, et al., *Graph Theory 1736–1936*, p. 94]

1912  Jules Henri Poincaré died very suddenly from an embolism while dressing, in his 59th year. [Thanks to Howard Eves]

1935  The first problem was entered into the Scottish Book, a large bound notebook that Stefan Banach brought to the Scottish Cafe in Łwów for mathematicians to record research problems. Many of the problems offered prizes to the solver. They ranged from "5 small beers" to "100 grammes of caviar." This book has been translated into English and edited by R. D. Mauldin.

## 18 July

1635  Robert Hooke born. I would like to locate a picture of him, but conjecture none exist. There are two possible reasons for this. Hooke and Newton were bitter rivals and Newton served as President of the Royal Society for years after Hooke's death, so perhaps destroyed any that existed. Also Hooke was handicapped so perhaps he refused to sit for a portrait.

1768 Jean Robert Argand born. His single original contribution to mathematics was the invention and elaboration of a geometric representation of complex numbers and operations on them. In this he was preceded by Wessel and followed by Gauss. See DSB 1, 237.

1852 Paul Carus, philosopher, born.

1853 Birthdate of the Dutch physicist Henrik Antoon Lorentz.

1872 Weierstrass, in a lecture to the Berlin Academy, gave his classical example of a continuous nowhere differential function. See Big Kline, p. 956.

1979 Great Britain issued a stamp honoring *Alice's Adventures in Wonderland*. [Scott #870].

## 19 July

1595 "God in creating the universe and regulating the order of the cosmos had in view the five regular bodies of geometry as known since the days of Pythagoras and Plato." So did Kepler record his discovery that the universe was based on the Platonic solids, a conjecture he published in 1596. [*Great Books of the Western World*, vol. 16, p. 841]

1767 François-Joseph Servois born. He coined the word "distributive."

1799 The Rosetta stone was found by Napoleon's troops in the Nile delta. It attracted the interest of the learned men with Napoleon, which included several mathematicians, and copies were circulated to scholars. The text is in Greek, hieroglyphics and demotic Egyptian scripts and was deciphered by Thomas Young and François Champollion. The cartouches on the stone, which contained royal names, were the key to decipherment. It is now a prized possession of the British Museum.

1819 Poisson submitted a paper on the solution of the wave equation. He used the method of power series, but the techniques advocated by Cauchy and Fourier using complex variables and "Fourier analysis" won out. [Ivor Grattan-Guiness, *Convolutions in French Mathematics, 1800–1840*, pp. 682, 687ff, 1393]

1865 Birthdate of Wilhelm Wirtinger.

1971 Ireland issued two stamps to honor the centenary of the birth of John Millington Synge (1871–1909), poet and dramatist. [Scott #307-8]. How is he related to the mathematician?

## 20 July

1632 Pierre de Carcavi became a member of the parliament of Toulouse. His friendship with Fermat dates from this time. [DSB 3, 63]

1798 The Battle of the Pyramids during Napoleon's Egyptian campaign. It is a myth that his troops damaged the Sphinx by using it for target practice.

1866 Georg Friedrich Bernhard Riemann died in Bolzano, Italy, at age 39. The inscription on his tombstone (translated from the German) reads: "All things work together for good to them that love the Lord." [Thanks to Howard Eves]

1959 The first "International Mathematical Olympiad" began in Bucharest, Romania. It lasted until 30 July and involved teams from seven Eastern Euroean countries. [*The College Mathematics Journal*, 16 (1985), p. 333]

1969 Neil Armstrong, now of Lebanon, OH, was the first man on the moon; Edwin Aldrin was a close second. Armstrong all but quoted what D. T. Whiteside wrote two years earlier about Isaac Newton: "May this present edition be a small step towards that long-overdue monument to a man who in so many areas of human thought himself took a giant's leap." See *The Mathematical Papers of Isaac Newton*, I, xxxvi and VIII, xxix.

1976 Viking I, the first successful Martian probe, landed on Mars.

## 21 July

1807 Gauss, in a letter to his friend Olbers, praised the mathematical ability of Sophie Germain. [Thanks to Howard Eves]

1820 Oersted announced his discovery of electromagnetism.

1861 Herbert Ellsworth Slaught born.

1967 Brazil (Scott #1053) issued a stamp to commemorate the 6th Brazilian Mathematical Congress. It depicted, in bright blue and black, a Möbius strip—the first time that this famous shape has been shown on either stamp or coin. [*Journal of Recreational Mathematics*, 1(1968), 44]

## 22 July

1694 Johann Bernoulli sent "L'Hospital's rule" to L'Hospital under the terms of their agreement of 17 March 1694.

1784 Friedrich Wilhelm Bessel born. He is noted for the special class of functions that have become an indispensable tool in applied mathematics. This, like all of his mathematical work, was motivated by his work in astronomy. [DSB 2, 101]

1795 Gabriel Lamé born in Tours, France.

1844 Birthday of Rev. William Archibald Spooner, Anglican clergyman and warden of New College, Oxford, England. His name lives on in the word spoonerism, an accidental (or intentionally humorous) reversal of initial letters or syllables of two or more words. The good cleric's spoonerisms included "queer old dean" for dear old queen and "swell foop" for fell swoop. Do you know what a fell swoop is?

1882 Konrad Knopp born. He is best known for comprehensive book on infinite series.

1925 After Norbert Wiener suggested to his friend Phillip Franklin in a letter that they hang a sign outside their office at MIT reading "Wiener and Franklin. Wholesale and Retail Mathematicians and Exporters," he wrote: "As to the state of the market: differential geometry seems rather quiet, and some of the principal operators have deserted it for other securities. Real and complex variables continue firm, without much change. Analysis situs has a bull market. Bull operators have been very active in differential equations, also. Quantum theory continues speculative, with chances of a very sharp rise, but the market contains a lot of wildcat stock. Hilbert, Brouwer, and Co. are doing well with mathematical logic." From *Science in America*, ed. Nathan Reingold, p. 384.

1933 Wiley Post startled the world by completing the first solo airplane flight around the world. The 15,400 mile flight lasted seven days, 18 hours, 49 and 1/2 minutes. Two years later he was killed in an airplane crash with humorist, Will Rogers. [*Scientific American*, November 1933]

1943 William Fogg Osgood died. Although his nickname was "Foggy," this was not an apt description of him as a teacher. He instilled the habit of careful thought in Harvard students for 43 years. His *A First Course in Differential and Integral Calculus* (1907) was revised once and reprinted 17 times.

1983 *Science* reported that Gerd Faltings of Wuppertal University in Germany proved the sixty-year-old Mordell conjecture: most equations of degree higher than three have only a finite number of rational solutions. In particular, this applies to Fermat's Last Theorem. [*Mathematics Magazine* 57 (1984), p. 52].

## 23 July

1754 Joseph Louis Lagrange, 18, published his first work in the form of a letter in Italian (He was Italian born. Only his great-great-grandfather Lagrange was French, all other ancestors were Italian). A month later he realized that he had rediscovered Leibniz's formula for the $n$-th derivative of a product. See DSB 7, 560.

1775 Etienne Louis Malus born in Paris. He was the son on the Treasurer of France. His primary interest was mathematical optics. [Ivor Grattan-Guiness, *Convolutions in French Mathematics, 1800–1840*, p. 473]

1904 The ice cream cone was introduced at the St. Louis world's fair.

1964 W. W. Rogosinski died.

## 24 July

1851 Birthdate of Friedrich Hermann Schottky.

1856 Emile Picard born.

1860 Yale University authorized the granting of Doctor of Philosophy degrees. The first such degrees in the U.S. were awarded in 1861 by Yale to Eugene Schuyler, James Morris Whiton, and Arthur Williams Wright. [Kane, p. 215] Is the first any relation to the mathematician Aaron Schuyler (1828–1913)?

## 25 July

1783 Founding of the Royal Academy of Science in Turin. [Muller]

1807 Gauss named Professor of Astronomy and director of the new observatory in Göttingen. [Tord Hall, *Carl Friedrich Gauss. A Biography*, MIT Press, 1970, p. 68]

1915 I. P. Egorov born.

## 26 July

1732 George Berkeley gave his farm near Newport, Rhode Island to the College of New Haven [now Yale University] to endow two graduate Fellows in Greek and Latin. This was the first provision for graduate study in America. Berkeley is known in mathematics for his *Analyst* (1734), which criticized the foundations of the calculus. See G. P. Conroy, "Berkeley and Education in America," *Journal for the History Ideas*, 21(1960), pp. 211-221.

1766 "To your care and recommendation am I indebted for having replaced a half-blind mathematician by a mathematician with both eyes, which will especially please the anatomical members of the academy." So wrote Frederick the Great to d'Alembert, thanking him for his suggestion of hiring Lagrange to succeed Euler at the Berlin Academy. [*AMM* 34(1927), p 128]

1925 Gottlob Frege died. He was the greatest logician since Aristotle.

1941 Henri Léon Lebesgue died.

1976 Kenneth Appel and Wolfgang Haken of the University of Illinois communicated their solution to the Four Color Problem to the *Bulletin of the American Mathematical Society*. The solution used over 1000 hours of computer calculation. [Eves, *Adieu*, 284°]

## 27 July

1801 Sir. George Biddell Airy born in Alnwick, England.

1829 By a remarkable coincidence, both Cauchy and Sturm sent papers to the *Académie des Sciences* dealing with differential equations. Both of them used techniques which we recognize as matrix methods. Thus they are early contributers to linear algebra, a field which is usually dated to Cayley's introduction of matrices in 1858. [Ivor Grattan-Guiness, *Convolutions in French Mathematics, 1800–1840*, p. 1150]

1837 At a meeting of the Berlin Academy of Sciences, Dirichlet presented his first paper on analytic number theory. He proved the fundamental theorem that bears his name: Every arithmetical series $an + b$, $n = 0, 1, 2, \ldots$ of integers where $a$ and $b$ are relatively prime, contains infinitely many primes. The result had long been conjectured. Legendre tried hard for a proof but could only establish special cases such as $4n + 1$. [DSB 4, 124]

1871 Birthdate of Ernest Friedrich Ferdinand Zermelo. In 1904 he formulated the Axiom of Choice in Set Theory. Years later, when he refused to give the Nazi salute, he was threatened with dismissal from his univeristy position. In reply, he resigned.

1948 Hungary issued a stamp commemorating the centenary of the birth of the physicist Baron Roland Eőtvős[1] (1848–1919). [Scott #840].

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[1] One of the neat things about TEX is that it allows you do distinguish Eőtvős and Gödel by their accents.

## 28 July

1619 Kepler wrote Napier expressing his enthusiasm for Napier's invention of logarithms. [DSB 9, 613]

1818 Gaspard Monge died in disgrace in Bourbon Paris, having been stripped of his place in the reorganized *Académie* of 1816. Although he contributed to differential equations and the geometry of surfaces, his special interest was descriptive geometry. Employed as a teacher, he made significant contributions to educational reform. [Ivor Grattan-Guiness, *Convolutions in French Mathematics, 1800–1840*, p. 616]

1851 A total solar eclipse was photographed for the first time.

1866 The first act legalizing the employment of the metric system was approved (14 Stat. L. 339). The act provided that it "shall be lawful throughout the United States of America to employ the weights and measures of the metric system." [Kane, p. 701]

1899 Cantor asks Dedekind whether the set of all cardinal numbers is itself a set, because if it is it would have a cardinal number larger than any other cardinal. Big Kline, p. 1003.

1954 Gerd Faltings was born in Gelsenkirchen-Buer, West Germany. In 1986 he received a Fields Medal for solving Mordell's Conjecture using arithmetic algebraic geometry. For a picture see *International Mathematical Congresses. An Illustrated History, 1893–1986*, edited by Donald J. Albers, G. L. Alexanderson and Constance Reid, p. 49.

## 29 July

1654 Pascal wrote a letter to Fermat, arguing a result that Fermat had concluded in an earlier letter about a probability problem. [*Archive for History of Exact Science*, vol. 17, p. 232; Thanks to Dave Kullman]

1739 D'Alembert, age 21, submitted his first mathematical paper to the Academy of Sciences. [Hawkins, *Jean D'Alembert*, p. 19].

1773 First schoolhouse West of the Alleghenies.

1839 Death of de Prony. Cauchy was elected his successor at the *Bureau des Longitudes* but was not admitted as he refused to take the oath of allegiance. [Ivor Grattan-Guiness, *Convolutions in French Mathematics, 1800–1840*, p. 1252]

1867 Thomas Hill, president of Harvard College, who was also somewhat of a mathematician, wrote Benjamin Peirce, who was a professor there: "I have the honor of informing you that the University, on Commencement Day, conferred on you the Degree of Doctor of Laws in recognition of the transcendent ability with which you have pursued mathematical physical investigations, and in particular for the luster which she has herself for so many years borrowed from your genius." [P. 10 of Benjamin Peirce, AMM offprint, 1925]

1944 David Eugene Smith died in New York City at the age of eighty-four. For a brief biography and portraits of this eminent historian of mathematics see *Scripta Mathematica* 11(1945), 209–212.

1958 President Eisenhower signed the National Aeronautics and Space Act. NASA opened for business on 1 October 1958, and within a week launched Project Mercury—the start of the U.S. manned space program.

1962 R. A. Fisher died.

## 30 July

1983 The Sumida River Festival in Tokyo celebrated its 250$^{\text{th}}$ anniversary, as the oldest, grandest fireworks festival in Japan. The festival spent $400,000 on the hanabi—literally "fire flowers"— alone: 17,500 shells in an hour and 20 minutes, none bigger than four-and-a-half inches in diameter. How many shells is that per minute? [*New York Times*, July 17, 1983, sect. 10, p. 37]

1985 Julia Robinson died of leukemia. After receiving her Ph.D. in 1948 under the direction of Alfred Tarski, she began work on Hilbert's tenth problem, the problem which occupied most

of her professional life. For more about her, see *Women of Mathematics. A Biobibliographic Sourcebook* (1987), edited by Louise S. Grinstein and Paul J. Campbell and *More Mathematical People* (1990), edited by Donald J. Albers, G. L. Alexanderson and Constance Reid.

# 31 July

1669 Lucasian professor Isaac Barrow sent John Collins a manuscript of Newton's *De analysi* and thereby Newton's anonymity began to dissolve. It was a summary of Newton's work on the calculus and was written after Newton saw Nicholas Mercator's *Logarithmotechnia* (1668) which contained the series

$$\ln(1+x) = x - \frac{x^2}{2} + \frac{x^3}{3} - \frac{x^4}{4} + \cdots$$

Newton wrote his paper in order that he would not lose credit for his work on infinite series. Collins immediately recognized Newton's genius. Although not published until 1711, this paper led to Newton's appointment as Lucasian professor on 29 October 1669. [Westfall, 204]

1704 Gabriel Cramer born. He is best known for "Cramer's Rule," a method for solving systems of simultaneous linear equations using determinants. The method is extremely inefficient, and should never be used except to write down the solution in closed form.

1726 Nikolaus II Bernoulli died.

1784 Denis Diderot died.

1790 The U.S. Patent Office issued its first patent to Samuel Hopkins of Vermont for his "process for making pot and pearl ashes," whatever they are. Since George Washington and Thomas Jefferson signed Hopkins' patent, more than 4 million have been issued.

1851 Gauss witnessed the opening ceremonies when the newly constructed railway from Cassel reached Göttingen. [Thanks to Howard Eves]

1927 F. E. Browder born.

1943 Ireland issued—as its first stamp with a mathematical theme—two stamps to celebrate the centenary of the discovery of Quaternions by Sir William Rowan Hamilton. [Scott #126-7].

1962 Greece issued a postage stamp to honor the inauguration of the Democritus Nuclear Research Center at Aghia Paraskevi. Democritus (460?–370? BC) is the father of Atomism. [Scott #716-7].

1985 The second full moon this month (the other was on the 2nd). This only happens "Once in a blue moon"—and this is the origin of the phrase. Consequently, there were thirteen full moons in the year 1985.

1992 In an editorial in *Science* on "Conflict of Interest Policy", Daniel E. Koshland, Jr. writes "The key here is to have all the information out in the open, not to conclude that the person with a conflict is necessarily wrong. If the devil advocates two plus two is four, it is not automatic that two plus two is not four. And if an angel advocates two plus two is five, that does not make two and two equal five." [*Science*, vol. 275, p. 595]

# AUGUST

## 1 August

1767 "Mason and Dixon finished drawing the world's longest straight line." [*366 Dumb Days in History*, by Tom Koch]

1881 Otto Toeplitz born in Breslau, Germany. In 1905 he received his Ph.D. in algebraic geometry at the university there and then moved to Göttingen, where he was deeply influenced by the work of Hilbert. He was also interested in the history of mathematics and held that only a mathematician of stature is qualified to be a historian of mathematics. In 1949 he published an introduction to the calculus on a historical basis. This delightful book is available in English as *The Calculus. A Genetic Approach.* [DSB 13, 428]

1944 The MARK I computer began operation at Harvard.

1947 The Netherlands issued a postage stamp honoring Jan de Witt (1625–1672), who did important early work dealing with analytic geometry. [Scott #B177].

1963 Greece issued a postage stamp picturing the "Acropolis at Dawn" by Lord Baden-Powell. [Scott #759].

1980 Michael Aschbaher wrote Daniel Gorenstein that he had completed the classification of the finite simple groups. This culminated a 20-year effort by some 300 group theorists. The complete proof is about 5000 pages long. [*Mathematics Magazine* 54 (1981), p. 41].

## 2 August

1823 L. N. M. Carnot died. [Thanks to Howard Eves]

1902 Mina Rees born in Cleveland, Ohio. After attending Hunter College she received her doctorate from the University of Chicago in 1932. Her dissertation, under the direction of L. E. Dickson, dealt with division algebras. Although she began in pure mathematics, she is best known for the work on applied mathematics that she did during World War II for the Office of Naval Research. In 1962 she became the first person to receive the Award for Distinguished Service to Mathematics from the MAA. See *Women of Mathematics. A Biobibliographic Sourcebook* (1987), edited by Louise S. Grinstein and Paul J. Campbell.

1932 Anderson discovered the positron.

1939 Albert Einstein "wrote" President F. D. Roosevelt that "Some recent work by E. Fermi and L. Szilard ... leads me to expect that the element uranium may be turned into a new and important source of energy in the immediate future. ... This new phenomenon would also lead to the construction of bombs, and it is conceivable—though much less certain—that extremely powerful bombs of a new type may be constructed." Roosevelt quickly started the Manhattan Project. Einstein later regretted signing this letter, which was written by Leo Szilard. For the full text of the letter, see *Einstein. A Centenary Volume* (1979), edited by A. P. French, p. 194.

## 3 August

1492 Columbus sailed.

1596 Fabricus discovered light variations of Mira.

1747 Diderot and d'Alembert replace de Gua, who had earlier done much to systematize analytic geometry, as director of the publishing project which was to become the celebrated *Encyclopédie*. [DSB 5, 567]

1750 The first (U.S.) teaching methods book was completed by Christopher Dock. It was originally written in German and was printed twenty years later in Germantown, Pennsylvania. The preface was dated March 27, 1770. The full title was: "Schul-ordnung; or A Simple and Thoroughly Prepared School-Management clearly setting forth not only in what manner children may best be taught the branches usually given at school, but also how they may be well instructed in the knowledge of godliness." [Kane, p. 634]

1805 William Rowan Hamilton born. The date on his tombstone is 4 August 1805, the confusion being due to the fact that he was born at midnight. [Thanks to Howard Eves]

1823 Abel dated a letter to his friend Holmboe "Copenhague, l'an $\sqrt[3]{6064321219}$ (en comptant la fraction décimal)." Can you make sense of this? The year is immediate, but how do you get the date? [Abel, *Oeuvres* (1882), p. 254].

1914 On the very day Germany declared war on France a speeding automobile carrying the French orders of mobilization collided with the carriage of Louis Couturat, a noted pacifist. This accident killed the forty-six year old Couturat, then at the height of his career in logic. [DSB 3, 456]

1953 In honor of the 7th International Congress of History of Science, which was held in Jerusalem, August 4-11, 1953, Israel issued a stamp picturing Maimonides, Rabbi Moshe ben Maimon (1135-1204), a Jewish philosopher especially interested in the work of Aristotle. [Scott #74].

1958 The First ship to reach the North Pole was the submarine *Nautilus*, which reached 90 degrees North enroute from Hawaii to the Atlantic Ocean.

1979 "People are much more interested in the subject if they can figure out where it came from and how it developed." [A. Nerode, "Reminiscences of Logicians, II," p. 7, in *Aspects of Effective Algebra*]

## 4 August

1597 Galileo wrote Kepler thanking him for the copy of Kepler's *Mysterium cosmographicum*, which openly advocated the Copernican theory. Galileo admits he is also a Copernican. See 13 October 1597. [Eves, *Circles*, 159°]

1753 Euler, in a letter to Christian Goldbach, claimed that he had a proof of Fermat's Last Theorem for the case $n = 3$. He gave no proof in that letter and none was published until 1770 when he published his *Elements of Algebra* in Russian. You can read the proof in an English translation of this book that Springer Verlag reissued in 1984. But be warned—Euler's proof is wrong because it assumes that $Z[\sqrt{3}]$ has unique factorization. Fermat's last theorem is, of course, true for the case $n = 3$ and for many other cases. In fact, other methods that Euler developed can be used to provide a correct proof. See p. 187 of *Mathematics: The New Golden Age* (1988) by Keith Devlin for a discussion.

1810 Gauss married his second wife, Minna Waldeck, who bore him two sons and a daughter. [Thanks to Howard Eves]

1834 John Venn born in Hull, England. He is best known for the diagrams that he presented in his *Symbolic Logic* (1881). Leibniz was the first to systematically use geometric diagrams to represent syllogisms, and Euler developed the ideas, but Venn gets the credit for his book popularized them. This then is an example of someone receiving great acclaim for doing very little. [DSB 13, 612]

1837 Birthdate of E. L. W. Maximilian Curtze, expert on medieval mathematical texts. His work was aided by his excellent knowledge of the current mathematical literature, unusual talent for languages, and skill in deciphering hard-to-read handwriting. [DSB 3, 512]

1909 Saunders MacLane, American algebraist, born.

## 5 August

1775 Montucla, who was the anonymous editor, served as Royal Censur for a new edition of Jacques Ozanam's book on mathematical recreations (the first edition was written in Ozanam's spare time during war time and published in 1694). [*Osiris*, 1(1936), p. 541.]

1802 Neils Henrik Abel was born at Fommöy, a small island near Stavanger in Norway. Before going to the university in 1821 he attacked, with the vigor and immodesty of youth, the problem of the solution of the quintic equation. He submitted a solution for publication but found an error before it was published. In 1823 he proved the impossibility of a solution involving radicals that solves fifth or higher degree equations. See DSB 1, 13–14.

1895  Frederick Engels died in London.

1935  Institute of Mathematical Statistics founded.

1981  Jerzy Neyman, in a paper with his long-time friend and colleague Elizabeth Scott, wrote:

> Each morning before breakfast every single one of us approaches an urn filled with white and black balls. We draw a ball. If it is white, we survive the day. If it is black, we die. The proportion of black balls in the urn is not the same for each day, but grows as we become older ... Still there are always some white balls present, and some of us continue to draw them day after day for many years.

On this date, Neyman, age 87, drew a black ball. As he wished of many of his friends, "May the earth rest lightly on him." [From a review, by Robert V. Hogg, of *Neyman—From Life*, by Constance Reid (Springer, 1983), in the *The College Mathematics Journal*, 15(1984), 82–84]

1985  Mary P. Dolciani Halloran, noted writer of several High School texts, of Hunter College died at the age of 62. The MAA book series *Dolciani Mathematical Expositions* is named in her honor.

## 6 August

1667  Johann (Jean) I Bernoulli born.

1741  English laywer and mathematician John Wilson born (d. 1973). The theorem that bears his name [If $p$ is prime, then $(p-1)! \equiv -1 \pmod{p}$] was published without proof in Waring's *Meditationes algebraicae* of 1770, but we now know that Leibniz knew the result. The first published proof was by Lagrange (1773), who showed that it is equivalent to Fermat's Little Theorem of 1640:

$$p \quad \text{prime} \quad \& \quad p \nmid a \quad \implies \quad a^{p-1} \equiv 1 \pmod{p}.$$

Euler first proved this in 1736. Lagrange also showed that the converse of Wilson's Theorem is true. (The converse of Fermat's is false—the counterexamples are called pseudoprimes.) Sir Frederick Pollack has conjectured that Wilson's Theorem was a guess that neither he nor Waring could prove. See DeMorgan's *Budget of Paradoxes*, and DSB 14, 438.

1945  First atomic bomb explosion over a populated area, Hiroshima, Japan, from the Enola Gay, a B-29 bomber. The pilot was Colonel Paul Tibbits, the bombardier, Major Thomas Ferebee. [Kane, p. 45]

## 7 August

1620  Kepler's mother was arrested for witchcraft.

1799  The second, greatly augmented edition of Montucla's *Histoire des Mathématiques* appeared. [*Osiris*, 1(1936), p. 548.]

1869  Mary Frances Winston Newson born in Forreston, Illinois. She did graduate work at Bryn Mawr and Chicago, and then, after meeting Felix Klein at the zeroeth International Congress of Mathematicians in 1893, she attended Göttingen. Three years later, in 1896, she finished her dissertation on differential equations and passed her exams *magna cum laude*. In 1897 she became the first American woman to receive her Ph.D. from a European University. See *Women of Mathematics. A Biobibliographic Sourcebook* (1987), edited by Louise S. Grinstein and Paul J. Campbell.

1944  Harvard MARK I dedicated. [Goldstein, *Computer from Pascal to von Neumann*, p. 111]

1985  Gábor Szegő, Professor Emeritus at Stanford, died at the age of 90. He co-authored with George (originally Györogy) Pólya (who died exactly a month later) the renown book *Problems and Theorems in Analysis*.

## 8 August

1576  Laying of the cornerstone of Tycho Brahe's observatory on the island of Hveen. [Muller]

1609 Venetian Senate examines Galileo's telescope.

1786 Standards for the decimal system of money established.

1876 Thomas Alva Edison, of Menlo Park, New Jersey, obtained patent #180,857 for a "method of preparing autographic stencils for printing," the first mimeograph machine. See 17 February 1880.

1900 "We hear within us the perpetual call: There is a problem. Seek its solution. You can find it by pure reason, for in mathematics there is no *ignorabimus*." So said David Hilbert in his famous address, "Mathematical problems," to the second International Congress of Mathematicians at Paris. See BAMS 8(1902), 437–479, especially p. 445, for an English translation of the talk. Reid, *Hilbert*, has a general discussion [see p. 73].

1977 Derek T. Whiteside received the Sarton Medal, the highest honor that the History of Science Society can bestow, for his editorship of *The Mathematical Papers of Isaac Newton*. In delivering the award Richard S. Westfall said "Before Tom began, Newton's mathematics was largely a land of myth and fable." In his 25 years work on the papers, Whiteside has changed all that. [*ISIS* 69 (1978), pp. 86-87].

## 9 August

1207 An educational institution is founded for the study of the works of Bhaskara, an Indian mathematician and astronomer. [DSB 2, 115]

1477 University of Tübingen founded. [Muller]

1537 Franciscus Barocius born. In 1560 he published the first important translation of Proclus' commentary on the first book of Euclid's *Elements*. In 1587 he was brought before the Inquisition on charges of sorcery, more particularly of having caused a torrential rainstorm in Crete. [DSB 1, 468]

1593 Izaak Walton born. In the preface of *The Compleat Angler* he wrote "Angling may be said to be so like the mathematics that it can never be fully learnt."

1757 Thomas Telford born near Westerkirk, Dunfries, Scotland. He is the founder of modern bridge construction, his crowning achievement being the Menai suspension bridge in Wales. Do you know the shape of the cables on a suspension bridge? [Thanks to Doug Faires]

1932 John Charles Fields died. In his will he left funds for an international medal for contributions to mathematics. The International Congress of Mathematicians in Zurich in 1932 adopted the proposal, and the first Fields Medals were awarded at the Oslo Congress in 1936 to Lars Ahlfors, age 29 of Harvard, and Jesse Douglas, age 39 of Massachusetts Institute of Technology. [DSB 4, 617 and *International Mathematical Congresses. An Illustrated History, 1893–1986*, edited by Donald J. Albers, G. L. Alexanderson and Constance Reid.]

1975 To display Mexican-Lebanese friendship, Mexico issued a stamp of the Teacher's Monument in Mexico City by I. Naffa al Rozzi, which shows Cadmus, a mythical Phoenician, teaching the alphabet. [Scott #C467].

## 10 August

1548 Tartaglia and Ferrari met in a mathematical debate in the church of Santa Maria del Giardino dei Minori Osservanti in Milan. In the presence of a distinguished audience, which included the governor of Milan as judge, they argued over a problem that Ferrari posed on 24 May 1547, and which Tartaglia could not resolve. The next day, Tartaglia left in disgrace for his native Brescia. See MT 54(1961), 160–163. [DSB 4, 587].

1602 Gilles Personne de Roberval born.

1675 Greenwich Observatory founded.

1792 Against his better judgment, Monge was forced into the Ministry of the Navy and the Colonies of France. [Thanks to Howard Eves]

1843 Robert Adrain died. He was one of the first American mathematicians to do creative work.

1846 The Smithsonian Institution established in Washington. Benjamin Peirce was on the five-member committee that drew up the program for its organization. [DSB 10, 480]

1896 The death of German aviation pioneer, Otto Lilienthal, from injuries suffered in a gliding accident, led the Wright brothers to the serious study of flight. [DSB 14, 520]

1912 "Some time between August 10 and August 16 it became clear to Einstein that Riemannian geometry is the correct mathematical tool for what we now call general relativity." [From Abraham Pais, *Subtle is the Lord ... The Science and the Life of Albert Einstein*, as quoted in the *New York Times Book Review*, Nov. 28, 1982, p. 9]

1926 Carol Karp was born in Forest Grove, Michigan. She received her Ph.D. in 1959 from Southern California under the direction of Leon Henkin. She created the field of Infinitary Logics which studies logics such as $L_{\omega_1\,\omega}$ which allowed for the conjunction and disjunction of countably many formulas. This work has become very important in modern logic. See *Women of Mathematics. A Biobibliographic Sourcebook* (1987), edited by Louise S. Grinstein and Paul J. Campbell, pp. 86–91 for more details.

1960 Oswald Veblen, a world famous geometer, died in Brookline, MA, at age 80.

## 11 August

1464 Nicholas von Cusa died. We know his work in mathematics primarily because a home for the aged in Kues, which he generously endowed, has survived the ravages of time and war. Luckily his own manuscripts were housed there. [DSB 3, 512, 516]

1877 Hall discovered Deimos, outer satellite of Mars.

1909 First radio S.O.S.

## 12 August

1755 Lagrange sends Euler a summary of his work on the calculus of variations and isoperimetric problems.

1862 Jules Antoine Richard born.

1887 Erwin Schrodinger, theoretical physicist, born.

1961 Construction of the Berlin Wall began.

1985 Celebration of the centenary of the International Statistical Institute in Amsterdam begins. It lasted until August 22.

## 13 August

1727 Charles-Etienne-Louis Camas elected to the French Academy of Sciences because he had earlier won half the prize money in their competition for the best manner of masting vessels. [DSB 3, 39]. Did Euler get the other half?

1819 George Gabriel Stokes born.

1861 Birthdate of Cesare Burali-Forti, who discovered the antinomy of the class of all ordinals in 1897. He never held a permanent university position for he failed his *libera docenze*, or license to teach, because of the antagonism to the new methods of vector analysis on the part of some members of the examining committee. [DSB 2, 593]

1882 Logician William Stanley Jevons died.

## 14 August

1894 "The first summer meeting of the American Mathematical Society was held in one of the lecture-rooms of the Polytechnic Institute in Brooklyn, N.Y." Only ten papers were presented! The meeting lasted two days; August 15 was the second. [BAMS, 1(1894/95), p. 1]

1842 Birthdate of the geometer Jean-Gaston Darboux. [DSB 3, 559]

1850 Walter William Rouse Ball born in London. [Muller]

1865 Birthdate of the Italian algebraic geometer Guido Castelnuovo. When Jewish students were barred from the state universities in the 1930's, Castelnuovo organized courses for them. [DSB 3, 117]

1866 Charles-Jean-Gustave-Nicolas de la Vallée-Poussin born.

## 15 August

1758 Pierre Bouguer died. In 1727 he won the prize competition of the Académie Royal des Sciences on the masting of ships. In this competition Euler only received the "accessit." [Thanks to Doug Faires]

1768 Lagrange, in a letter to D'Alembert, expressed his difficulty in solving the problem: Given a nonsquare positive integer $n$, to find a square integer $x^2$ such that $nx^2 + 1$ shall also be a square. [Thanks to Howard Eves]

1789 Jakob II Bernoulli died.

1863 Birthdate of Aleksei N. Krylov, noted for mathematics, mechanics and engineering.

1951 The Soviet Union issued a postage stamp with a portrait of Sonya Kovalevskaya. [Scott #1570].

## 16 August

1705 Jakob Bernoulli died. He was so fascinated with the way the logarithmic spiral reproduces itself in its involute, its evolute, and its caustics of reflection and refraction, that he requested it be engraved on his tombstone, together with the inscription *Eadem mutata resurgo* (Though changed, I will arise the same). For a picture of the poorly drawn spiral in Basel see the *Two Year Journal*, 14(1983), p. 277.

1821 Birthdate of Arthur Cayley, British algebraist.

1837 Joseph-Marie de Tilly, Belgian mathematician, born. In 1899 he was dismissed from his teaching post at the École Militaire for unduly emphasizing the scientific education of future officers and using the notions of the infinitely small and the differential. [DSB 13, 414]

1914 Panama Canal opened to traffic.

1966 Stephen Smale, University of California, Berkeley, received the Fields Medal at the International Congress of Mathematicians in Moscow for his work on dynamical systems. See 26 August 1966.

1983 Poland issued a stamp celebrating the 50th anniversary of the Enigma Decoding Machine. [Scott #2582A].

## 17 August

1786 Death of Frederick the Great.

1807 First voyage of Robert Fulton's Steamboat *The Clermont* steamed up the Hudson River from Manhattan. [Thanks to Doug Faires]

1811 "Having to conduct my grandson through his coure of mathematics, I have resumed the study with great avidity. It was ever my favorite one. We have no theories there, no uncertainties remain on the mind; all is demonstration and satisfaction." So wrote Thomas Jefferson (1743–1826) to Benjamin Rush. Taken from *The Writings of Thomas Jefferson*, edited by A. A. Lipscomb, vol. 13 (1903), p. 75, as quoted from Cajori, *Mathematics in Liberal Education*, p. 109, which is a collection of interesting quotations on the value of mathematics.

1825 A royal decree granted Neils Henrik Abel, then 23, sufficient funds for a year's travel in France and Germany. [Thanks to Howard Eves]

1877 Hall discovered Phobos, inner satellite of Mars.

1941 When Herbert Robbins saw the proof sheet of the title page of *What is Mathematics?* with only the name Richard Courant on it, his first reaction was "My god, the man's a crook." Realizing that a quiet meeting on their co-authorship of the book would be impossible, Robbins wrote Courant on this date that, while the custom might be different in Europe, in this country the

junior author did receive credit. Courant backed down, and so today we know this lovely book as one by Courant and Robbins. For the two sides of this story see Constance Reid, *Courant in Göttingen and New York. The Story of an Improbable Mathematician* (Springer 1976), 223–226 and 230–232 as well as "An interview with Herbert Robbins," *The College Mathematics Journal*, 15(1984), 4–6.

## 18 August

1652 Florimond DeBeaune died. His name is attached to one of the first problems ever posed in differential equations.

1685 Brook Taylor born.

1834 Mt. Vesuvius erupted.

1868 Lockyer discovered helium in solar eclipse spectrum.

1881 "The matter is so perfectly clear that we cannot be amazed enough how the mathematicians so stubbornly insist on mystifying it." Comment of Friedrich Engels on a manuscript of Karl Marx on the differential calculus. [HM 4, 307]

## 19 August

1584 Birthdate of Pierre Vernier, developer of an accurate scale for the astrolabe.

1662 Blaise Pascal died.

1685 Brooke Taylor died. [Thanks to Doug Faires]

1758 Etienne Montucla received the censor's approbration for his *Histoire des mathématiques*, which is justly famous as a history of the mathematical sciences. [*Osiris*, 1(1936), p. 536.]

1939 Alan Baker born in London. In 1970 he received a Fields Medal for his work on Hilbert's seventh problem which dealt with transcendental numbers. See *International Mathematical Congresses. An Illustrated History, 1893–1986*, edited by Donald J. Albers, G. L. Alexanderson and Constance Reid.

## 20 August

1507 Bishop Johann Trithemius wrote the mathematician and astrologer Johann Virdung of Heidelberg to inform him that Georg Faust is not of the highest character, the seduction of young boys being cited as an example. [Thanks to Smoryński]

1601 Pierre de Fermat was born in Beaumont-de-Lomagne, France. Besides being the coinventor, with René Descartes, of Analytic Geometry, Fermat did important work in the theory of maxima and minima, quadrature (before the invention of the calculus), probability and optics. He is best known today for his work in number theory. [DSB 4, 566].

1672 Jan de Witt murdered by a mob from the (William of) Orange faction. For the previous twenty years he served as grand pensionary in Holland, essentially the prime minister of the Netherlands. Consequently this talented mathematician had little time to devote to mathematics. He wrote the first systematic account of the analytic geometry of the straight line and conics. It was published in Van Schooten's second Latin edition of Descartes' *Geometrie* (1659–1661). See DSB 14, 465.

1710 Thomas Simpson born.

1898 Birthdate of Polish theoretical physicist Leopold Infeld. In 1948 he published *Whom the Gods Love*, a biographical novel about Evariste Galois. [DSB 7, 10]

1955 Observances were held on the Island of Samos commemorating the 2500$^{\text{th}}$ anniversary of the founding of the first school of philosophy by Pythagoras. Four postage stamps were issued by Greece. Naturally one of them illustrated the celebrated 47$^{\text{th}}$ proposition of Euclid, the Pythagorean Theorem, by a 3–4–5 triangle with squares erected on its sides. [*Pythagoras* by Thomas Stanley, p. iv; Scott #582-5].

1957 Simon K. Donaldson born in Cambridge, England. In 1986 he received a Fields Medal for his work on the topology of four-manifolds. [*International Mathematical Congresses. An Illustrated History, 1893–1986*, edited by Donald J. Albers, G. L. Alexanderson and Constance Reid]

1972 Carol Karp died of breast cancer. At the time she was at the height of her career in logic. See 10 August 1926.

## 21 August

1560 The occurrence at the predicted time of a solar eclipse in Copenhagen turned Tycho Brahe toward a life of observational astronomy. [DSB 2, 401]

1757 Josiah Beigs, meteorologist and mathematician, born. This freethinking Democrat left his professorship at Yale for political reasons and became president of the University of Georgia. He applied Galileo's formula for fallen bodies to the nine day's fall of Lucifer and his angels, to determine that Hell was 1,832,308,363 miles deep. [Struik, *Origins of American Science*, p. 370]

1789 Birthdate of Augustin-Louis Cauchy.

1888 William Seward Burroughs of St. Louis obtained a patent for his adding machine, the first successfully marketed. In January, 1886, he incorporated as the American Arithmometer Corporation. See 16 January 1905, and 11 October 1887.

1893 The zeroeth International Mathematical Congress with representatives of seven countries was held in conjunction with the Chicago World's Fair on August 21–25. William E. Story of Clark University was president of the Congress. Felix Klein of Germany came at Kaiser Wilhelm's personal request. Klein brought nearly all of the mathematical papers published by his countrymen and a superb collection of mathematic models. [*AMS Semicentennial Publishers*, vol 1, p. 74].

1949 John Mauchly and J. Presper Eckert, Jr. demonstrate BINAC, a computer capable of calculating 12,000 times faster than a human being. [Leonard]

1972 Peru issued a Air Post Stamp picturing a Quipu. [Scott #C341].

## 22 August

1450 Gutenberg borrowed 800 guilden in gold at 6% interest (a low rate then) to develop his invention of printing from movable metal type. The first book produced was a 42-line Latin Bible, the famous Gutenberg Bible. [G. H. Putnam, *Books and Their Makers During the Middle Ages* (1896), p. 361].

1796 Baden Powell born in Stamford Hill, England. Savilian professor of geometry at Oxford from 1827 to 1854. He deserves credit for the modest reforms in mathematical education at Oxford in the 1850s. One son (he had 14 children by 3 wives) Robert Baden-Powell founded the scouting movement. See DSB 11, 115.

1851 "America" won yacht cup.

1932 The first experimental television program broadcast from the BBC, London.

## 23 August

1638 Descartes, in a letter to Mersenne, proposed his folium ($x^3 + y^3 = 2axy$) as a test case to challenge Fermat's differentiation techniques. To Descartes' embarrassment, Fermat's method worked better than his.

1735 Abraham deMoivre elected to the Berlin Academy after Philipp Naudé (1684–1747) presented a copy of deMoivre's *Miscellanea analytica* of 1730. Among other things this book contains work on the Fibonacci sequence. See "Abraham deMoivre" by Helen M. Walker, *Scripta Mathematica*, 2(1933), 316–333.

1829 Birthdate of Moritz Cantor, historian of mathematics.

1977 Dr. Paul MacCready's Gossamer Condor, powered only by the pilot, Bryan Allen, completed a 800-yard figure-8 flight to win the Kremer Prize. See July 12, 1979. [Air & Space]

1988 Hans Lewy died. [Thanks to Doug Faires]

## 24 August

79 Thousands were killed when the cities of Pompeii and Herculaneum were buried by the eruption of Mount Vesuvius.

1561 Bartholomeo Pitiscus born. He coined the word "Trigonometry," and first used it in print in 1595. [Thanks to Doug Faires]

1654 Pascal wrote a letter to Fermat, discussing Fermat's solution to the "problem of points." [*Archive for History of Exact Sciences*, 17, 236; Thanks to Kullman]

17?? William Neil died. [Thanks to Doug Faires, who credits *Timetables of Science*]

1778 Wronski born.

1932 Amelia Earhart became the first woman to make a transcontinental non-stop flight.

1971 The Soviet Union issued a stamp for the centenary of the birth of the British physicist, Ernest Rutherford. Beside his picture is a diagram of the movement of atomic particles which involves a hyperbola. [Scott #3888].

## 25 August

1844 Thomas Muir born. He is noted for a four volume work on the history of determinants.

1867 Michael Faraday died at Hampton Court, Middlesex, England.

1955 The People's Republic of China issued stamps honoring the mathematician Tsu Chung-chih (429–500), and astronomers Chang Heng (78–139) and Chong Sui (683–727) and physicist Li Shih-chen (1518–1593). [Scott #246, #245, #247, #248 respectively]

1959 The National Medal of Science was authorized by act of Congress (73 Stat. L. 431) for outstanding contribution in the physical, biological, mathematical, and engineering sciences on the basis or recommendation of the National Academy of Sciences. President Kennedy made the first presentation February 17, 1963, to the Hungarian-born aerodynamicist Theodor von Karmen. [Kane, p. 373] Gödel received one in 1975. Marston Morse did also. Did any other mathematicians?

1976 The Board of Governors of the MAA awarded an honorary life membership to Martin Gardner "for the substantial contributions he has made to the public appreciation of mathematics by his superb exposition in his texts and his column 'Mathematical Games'" in the *Scientific American*. Gardner was both honored and embarrassed to receive this award, for he had never taken a mathematics course in college. "I consider myself more a journalist and popularizer of mathematics than a genuine mathematician." While true, he has probability done more than anyone else to popularize mathematics. [*AMM* 83 (1976), p. 834].

## 26 August

1349 Thomas Bradwardine, archbishop of Canterbury, died of the plague. This medieval mathematical physicist studied the notion of change. [DSB 2, 390]

1572 Peter Ramus was cruelly murdered, by hired assassins, during the St. Bartholomew's Day Massacre. He was an early opponent of the teachings of Aristotle. See DSB 11, 287.

1743 Lavoisier born. [Thanks to Doug Faires]

1768 Capt. James Cook began the first circumnavigation of the globe.

1770 Lagrange, in a letter to d'Alembert, first uses the notation $\psi'(x)$ for the derivative. He first used it in print in a paper published in 1772. Although Lagrange used the notation in his diagramless *Mecanique Analytique* (1888), it did not catch on until after he used it in his *Théorie de functions analytiques* (1797). [*Oeuvres de Lagrange*, 13, p. 181].

1728 Johann Heinrich Lambert was born in Mulhouse, Alsace. His most famous results are the proofs of the irrationality of $\pi$ and $e$.

1875  Giuseppe Vitali born.

1920  Women's suffrage came into force in the U.S.

1966  Professor Stephen Smale, who received the Fields medal ten days earlier, condemned American military intervention in Vietnam and Soviet intervention in Hungary at a news conference in Moscow. For Smale's fascinating personal account see "On the Steps of Moscow University," *The Mathematical Intelligencer*, 6, no. 2, pp. 21–27.

## 27 August

1760  Leonhard Euler, in his *Letters to a German Princess on various topics of physics and philosophy*, explains how a surveyor uses a level. As an example he asks which end of the straight line between their homes is higher. He discusses the flow of the rivers that connect their homes, but gives the wrong answer to his question. For discussion of this famous error, see Eves, *Adieu*, 34°.

1798  Egyptian Institute founded by Napoleon in imitation of the Institut de France. [Thanks to Howard Eves]

1858  Birthdate of Giuseppe Peano.

1859  Oil struck by Edwin Laurentine Drake at Titusville, Pennsylvania. From a depth of 69 1/2 feet it produced 400 gallons per day. This was the first proof of oil in reservoirs beneath the Earth's surface and became the first commercially productive oil well. [Kane, p. 439] Should this be the 28 th as in TimeTables of Science????

1939  First jet flight in aviation history. [Air & Space]

1947  China (there was only one until 1949) issued four stamps honoring Confucius. [Scott #741-4].

## 28 August

1749  Johann Wolfgang von Goethe born.

1843  Oliver Wendell Holmes born.

1867  Maxime Bôchner born. After receiving his doctorate under Felix Klein in 1891 he returned to Harvard for a lifetime of teaching and research in differential equations. [DSB 2, 217]

1961  The Board of Governors of the MAA voted to name Dr. Mina S. Rees, (first) Dean of Graduate Studies at the City University of New York, the first recipient of their Award for Distinguished Service to Mathematics. From 1946 to 1953 she held several important positions at the Office of Naval Research and was instrumental in getting ONR to adopt the policy that mathematics was part of this country's total scientific effort and should be properly supported by government-sponsored research programs. [AMM 69(1962), pp. 185-187].

1974  Sweden issued a stamp picturing a spool and thread, with the thread stretched to form a string figure of a hyperbola. [Scott #1094].

## 29 August

1831  Michael Faraday discovered electrical induction.

1881  The founder of an important publishing house, Ferdinand Springer, born. Today Springer-Verlag is one of the most important publishers of advanced work on mathematics.

## 30 August

1701  John Smith to his nephew Roger Cotes, then a student at Trinity College, Cambridge: "We ... count it as a favour yt you can spare us any share of your affection from your dear Mrs. Mathesis; I am glad to hear yt she so easily yields to Your courtship, and has procured You such signal marks of favour from great men ..." [Ronald Gowing, *Roger Cotes Natural Philosopher*, p. 7]

1819  Joseph Alfred Serret born.

1906 Olga Taussky-Todd born Olmütz, then part of the Austro-Hungarian Empire (now Olomouc, Czechoslovakia). She received her Ph.D. in 1930 under Philip Furtwängler at Vienna in number theory. Her first job involved editing Hilbert's papers on number theory. See *Women of Mathematics. A Biobibliographic Sourcebook* (1987), edited by Louise S. Grinstein and Paul J. Campbell.

1907 John Mauchly born.

1908 A committee appointed by the Swiss society of naturalists reported its willingness, provided sufficient financial assistance could be secured, to publish the complete works of Euler in about 40 volumes. Today 80 volumes of Euler's *Opera Omnia* have been published, and the end is hardly in sight. [BAMS 15, 516]

1962 The hot line between the White House and the Kremlin installed. You might think that this has nothing to do with mathematics, but all such communications must be encripted to assure secrecy. And that involves mathematics. [Kane, p. 637]

## 31 August

1682 Michael Rolle published an elegant solution to a difficult problem publicly posed by Ozanam: Find four integers the difference of any two of which is a perfect square as well as the sum of the other three. This brought him public recognition. [DSB 11, 512]

1884 Birthdate of George Alfred Léon Sarton, historian of science and founder of the journal *Isis*.

1899 Cantor, in a letter to Dedekind, remarked that his "diagonal process" can be used to show that the power set of a set has more elements than the set itself. [DSB, 3, 55]

1944 Stefan Banach died. He was one of the creators of functional analysis.

1950 Gödel addressed the International Congress of Mathematicians, in Cambridge, Massachusetts, on his work in relativity theory. [Dawson]

### Sometime in August

1654 Fermat wrote Pascal that numbers of the form $2^{2^n} + 1$ are always prime, adding that "the proof of it is very difficult and I assure you that I have not yet been able to find it fully. I shall not set it for you to find unless I come to the end of it." A century later Euler showed $2^{2^5} + 1$ is composite. [*Scripta Mathematica*, 26(1963), 294 and Smith, *Source Book*, p. 561]

1684 Halley visits Newton. The *Principia* resulted in 1687. Need to know exact date. All I have is August 1684. [Westfall, p. 402]

# SEPTEMBER

## 1 September

1648  Marin Mersenne died.

1659  Joseph Saurin born. In the early seventeenth century he defended the calculus against the criticisms of Michael Rolle. See DSB 12, 117.

1698  The last Russian year to begin on September 1. January 1, 1699 began a new year.

1835  Political economist William Stanley Jevons born. He did early work in symbolic logic and built an early logic machine, the first that could solve complicated porblems faster than they could be solved by hand.

1848  Emil Weyr born.

1859  Carrington and Hodgson are first to observe a solar flare.

1936  The first meeting of the Association for Symbolic Logic was held in Cambridge, Massachusetts. Rudolf Carnap presented an invited address, "Truth in Mathematics and Logic," to an audience of three hundred. See *Journal of Symbolic Logic*, 1(1936), p. 120, or 27(1962), p. 258.

1939  World War II began, as German troops marched into Poland.

1964  The Ryukyu Islands issued a stamp commemorating the opening of the Ryukyu Islands–Japan microwave system for telephone and telegraph messages. Pictured is a parabolic antenna, one of the many applications of the reflective properties of the conics. [Scott #123]

1967  Harvey Friedman was appointed Assistant Professor of Mathematics at Stanford University, just three weeks before his nineteenth birthday. This is the youngest at which anyone has begun a university career. He is now a distinguished logician at The Ohio State University. (Guinness) See September 23, 1948, September 30, 1717, and November 19, 1982.

## 2 September

1808  Gauss writes Wolfgang Bolyai: "It is not knowledge, but the act of learning, not possession but the act of getting there, which grants the greatest enjoyment." [Eves, *Squared*, 203°]

1841  Paul Matthieu Hermann Laurent born. He developed statistical formulas for the calculation of actuarial tables and studied heat conduction.

1850  Alfred Pringsheim born.

1856  Wilhelm Franz Meyer born.

1865  William Rowan Hamilton died.

1878  Maurice Frechet born.

1923  René Thom born in Montbeliard, France. In 1958 he received a Fields Medal for his 1954 creation of cobordism in algebraic topology. His classification of manifolds used homotopy theory in a fundamental way and this work became an important example of general cohomology theory. See *International Mathematical Congresses. An Illustrated History, 1893–1986*, edited by Donald J. Albers, G. L. Alexanderson and Constance Reid.

1941  Norway issued a stamp commemorating the centennial of the cornerstone laying of a University of Oslo building. [Scott #246].

1958  The National Defense Education act was passed in response to Sputnik (4 October 1957). $840 million was appropriated to improve the teaching of mathematics, science, and foreign languages.

## 3 September

1575  "In the sixteenth century, Western mathematics emerged swiftly from a millennial decline. This rapid ascent was assisted by Apollonius, Archimedes, Aristarchus, Euclid, Eutocius, Hero, Pappus, Ptolemy, and Serenus—as published by Commandino," who died on this date. DSB 3, 364.

1752 The dates 3 to 13 September did not exist in England in 1752 due to the conversion to the Gregorian calendar. *Poor Richard's Almanac* for 1752 carried the catchy heading, "September hath XIX days." Much of Europe made the change in 1582, and since 1600 was a leap year under the Gregorian but not the Julian calendar, England had to omit eleven days, not ten. See 24 February 1755 and 5 October 1582.

1814 James Joseph, youngest child of Abraham Joseph, born in London. The eldest son, an actuary, eventually migrated to the U.S. where, for unknown reasons, he took the surname Sylvester. The rest of the family soon followed suit, so that is how James Joseph Sylvester got his name. [Eves, *Adieu*, 62°; *Osiris*, 1(1936), 87, indicates the eldest son's original name was Sylvester Joseph and later he went by Sylvester Joseph Sylvester.]

1822 A wagon train containing three tons of books arrived at Allegheny College in Meadville, PA. They came from one of the finest private libraries in America, that of James Winthrop. He was a descendant of John Winthrop, first governor of the Massachussettts Bay Colony. His father was Professor of Mathematics and Natural Philosophy at Harvard and so the collection contained a number of important mathematical works. Winthrop was upset that Harvard had not given him an honorary degree and so he gave the books to Allegheny. [Allegheney College *Alumni Bulletin*, June 1933.]

1884 Solomon Lefshetz born in Moscow. He invented the phrase "algebraic topology." See *A Century of Mathematics in America, Part I*, 1988, p. 171.

## 4 September

 973 Birthdate of Al-Biruni who wrote 15 works on mathematics, three of which are extant. [DSB 2, 152]

1675 John Collins, after mentioning Tschirnhaus in a letter to James Gregory, writes: "... there being present with him a Dane named George Moorh [Georg Mohr (1640–1697)] who lately published in low Dutch, two little Books the one named *Euclides Danicus* where he pretends to perform all Euclids problems with a paire of Compasses only without Ruler, and another intituled *Euclides Curiosus*, wherein with a Ruler and a forke (or the Compasses at one opening) he performs the same ... " See MT 53(1960), 127–132.

1893 "The proof of the transcendency of $\pi$ will hardly diminish the number of circle-squarers, however; for this class of people has always shown an absolute distrust of mathematicians and a contempt for mathematics that cannot be overcome by any amount of demonstration." Felix Klein in *The Evanston Colloquium. Lectures on Mathematics* (1894), pp. 52–53.

1899 A 1904 academic calendar marked this day as the day Dedekind died. He wrote the publisher saying that while 4 September might be correct, 1899 certainly was not, for on that day he had enjoyed a stimulating mathematical discussion with his dinner guest and honored friend, Georg Cantor. See 12 February 1916. [Eves, *Revisited*, 281°]

1963 India issued a stamp honoring Dadabhoy Naoroji (1825–1917), mathematician and stateman. [Scott #376].

1969 Marcel Riesz died.

## 5 September

1666 The fire of London was extinguished after four days and nights. Some 13,000 buildings were destroyed. It took a lot of architechts to rebuild. Sadly for mathematics, a talented young mathematician, who was also something of an architect was available. This explains how mathematics lost Christopher Wren.

1667 Girolamo Saccheri born. He was the first to publish the effects of denying Euclid's fifth postulate [MT, Sept 83].

1667 Henry Oldenburg died.

1935 "Emmy Noether's career was full of paradoxes, and will always stand as an example of shocking stagnancy and inability to overcome preudice on the part of the Prussian academic and civil

service bureaucracies. Her appointment as *Privatdozent* in 1919 was only possible because of the persistence of Hilbert and Klein, who overcame some extreme opposition from reactionary university circles. The basic formal objection was the sex of the candidate: 'How can we allow a woman to become a *Privatdozent*! after all, once she is a *Privatdozent*, she may become a Professor and member of the Uiversity Senate; is it permissible for a woman to enter the Senate?' This provoked Hilbert's famous reply: 'Meine Herren, der Senate is ja keine Badenanstalt, warum darf eine Frau nicht dorthin! [Gentlemen, the Senate is not a bathhouse, so I do not see why a woman cannot enter it!]'"—from an address, "In Memory of Emmy Noether," delivered by P. S. Alexandrov, then president of the Moscow Mathematical Society. Quoted from *Emmy Noether: 1882–1935*, by Auguste Dick. Birkhäuser, 1981. [Notices AMS, 38(1991), 706]

1945 Romania issued two postage stamps to commemorate the 50<sup>th</sup> anniversary of the mathematics journal *Gazeta Mathematica*. Editors I. N. Ionescu (1870–1948), Gheorge Titeica (1873–1939), A. O. Idachimescu (1895–1943), and Vasile Cristescu (1869–1929) are pictured on the first of them. [Scott #596-7].

## 6 September

1620 149 Pilgrims set sail from England aboard the Mayflower, bound for the New World.

1893 Dimitrij Alexandrowitsch Grave born.

1909 Word was received that Admiral Robert Peary had discovered the North Pole five months earlier on April 6, 1909. Question: Where on the Earth, other than the North Pole, can one travel a mile South, a mile East, a mile North, and end up in the same spot?

1923 At an AMS meeting at Vassar College George Y. Ranich, then of the University of Michigan, gave a talk on the class number of quadratic fields. L. J. Mordell who was in the audience noted he made no reference to a rather pretty paper by one Rabinowitz of Odessa. When Mordell commented on this the speaker blushed and stammered "I am Rabinowitz." He had changed his name when he moved to the U.S. [Eves, *Adieu*, 131°; BAMS 29, pp. 433 and 437]

1927 Anna Johnson Pell Wheeler (1883–1966) began the 11<sup>th</sup> series of Colloquium Lectures at the American Mathematical Society Meeting in Madison, Wisconsin, being the first woman to be invited to do so. She spoke on "The theory of quadratic forms in infinitely many variables and applications." "One hundred twenty-seven persons attended these lectures, the largest number registered for any colloquium so far held, though . . . the gradient seems to be on the decrease." For a sketch of her life see HM 9(1982), pp. 37-53, especially p. 47. Need to check BAMS 33(1927), pp. 664-665 for exact date. All I have now is 6-10 Sept.

1930 Kurt Gödel, a logician who was immediately to become famous, addressed the annual meeting of the Deutsche Mathematiker-Vereinigung in Königsberg, on his completeness theorem. Gödel solved this problem for his doctoral dissertation under the direction of Hans Hahn in 1929.

1956 Witold Hurewicz died.

1979 Sweden issued a stamp portraying Johan Olof Wallin (1779–1839), Archbishop and poet, and the array:

$$2 \quad 9 \quad 8$$
$$3 \quad 4 \quad 5$$
$$5 \quad 6 \quad 4$$

What is the significance of these numbers? (I don't know). [Scott #1294]

## 7 September

1460 Founding of the University of Basel. Both Bernoulli brothers later taught there.

1707 Georges-Louis Leclerc, Compte de Buffon born. Buffon's needle experiment uses probability to estimate $\pi$. He introduced calculus into probability theory.

1789 American writer James Fenimore Cooper born. He was expelled from Yale for roping a donkey into a professor's chair. Earlier he was put on probation for using gunpowder to blow open a

dormitory door.

1844 In a letter to George Boole, Arthur Cayley indicated that he is "much interested" in a paper on quaternions by Sir William Rowan Hamilton: "the remarkable part of which is evidently that the factors of the product are not convertible [commutative], but as he observes, *why should they be?*" Hamilton's discovery of quaternions was an important step in the development of abstract algebra. [Desmond MacHale, *George Boole, His Life and Work*, Boole Press, Dublin, (1985), p. 57].

1884 Georges Valiron born.

1909 The first junior high school in the United States, Indianola School, was opened in Columbus, Ohio. [*Ohio and Its Resources*, Ohio Chamber of Commerce, p. 7]

1918 Peter Ludvig Mejdell Sylow died. He is remembered today for his three theorems in group theory.

1923 The AMS adopted a resolution "sanctioning the establishment of a lectureship to be known as the Josiah Willard Gibbs Lectureship, the lecture to deal in semi-popular form with some aspect of mathematics or its applications." [BAMS 29, 435] See 29 Feb. 1924.

1927 The first Polish Mathematical Congress opened. [Kuratowski, *A Half-Century of Polish Mathematics*, p. 53]

1930 Kurt Gödel, in a discussion on the foundations of mathematics organized by the Vienna Circle, announced his famous theorem on the incompleteness of arithmetic: There are true but unprovable statements. (Dawson)

1984 *Science* (pp. 1006-1007) reported that Louis de Branges of Purdue proved the 1916 Bieberbach conjecture which deals with one-to-one analytic functions on the unit disk which fix the origin. He proved that if a power series

$$f(z) = \sum_{n=1}^{\infty} a_n z^n$$

converges for all $z$ in the unit disk, and $f(z)$ is one-to-one, then $|a_n| < n$ for all $n$. [*Mathematics Magazine* 50(1985), p. 53].

1985 George Pólya, Professor Emeritus at Stanford died at the age of 97. In 1963, Pólya received the MAA award for Distinguished Service to Mathematics. The George Pólya Award for noteworthy expository articles in the *College Mathematics Journal* is named in his honor.

## 8 September

1584 Gregorius Saint Vincent born. His *Opus geometricum* (1647) contains the most beautiful frontispiece of any mathematics text. In this work, Gregorius was the first to develop the theory of the geometric series and also the first to show that the area under a hyperbola is a logarithm.

1588 Marin Mersenne born. He served as the hub of the most important correspondence network for scientists in the seventeenth century.

1679 Leibniz told Huygens of his *characteristica generalis*, which involved a universal mathematics that later blossomed into the symbolic logic of George Boole, and still later, in 1910, into the great *Principia Mathematica* of Whitehead and Russell. [Thanks to Howard Eves]

1882 Joseph Liouville died.

1930 Hilbert's radio broadcast in Königsberg. It contains the famous phrase "Wir müssen wissen. Wir werden wissen." (We must know, we will know). These optimistic words are inscribed over Hilbert's grave in Göttingen. A recording is available in the *Gedenkband*. [Thanks to Smoryński]

## 9 September

1409 Pope Alexander V confirms the University of Leipzig. [Muller]

1883 Victor Puiseux died.

1945 First computer "bug" logged at 1545 hrs. Grace Hopper was running the computer at the time and there was a failure. When she investigated she found that a moth had gotten into the machinery and caused the problem. She removed it and taped it into the log book of the computer. Thus a bit of computer jargon was born.

1967 The Soviet Union issued a postage stamp showing checker players with part of a board in the background. Although more than 50 stamps have been issued on chess, this was the first on checkers. [*Journal of Recreational Mathematics*, 2(1969), 50]

1977 Czechoslovakia issued a stamp picturing a book illustration by Nicole Claveloux for a book of Lewis Carroll. Pictured are a bear and flamingos. [Scott #2133].

## 10 September

1542 In an apocryphal letter to Rabelais, Charles V of Spain offered 1000 escudos for the solution of the quadrature of the circle problem. This letter was one of 27,345 forged by Denis Vrain-Lucas between 1861 and 1869 and sold to Michel Chasles for 140,000 franks. [*Mathematics Magazine* 61 (1988), pp. 159-160].

1749 Emilie du Châtelet died of childbed fever (Voltaire was her lover then, but not the father of the child). Ten years later her annotated translation of Newton's *Principia* was published. It is still the only French translation. [DSB 3, 216]

1838 Charles Sanders Peirce born.

1885 Galton introduced regression.

1931 Ernst Eduard Kummer (1810–1893) solved a prize problem dealing with the expanding $\sin(nx)$ in powers of sin and cos which was posed by his professor Heinrich Ferdinand Scherk, and consequently was awared his Ph.D. degree at age 21 from the University of Halle. He taught as a Gymnasium teacher for 11 years before he became a professor at the University of Breslau. [DSB 7, 521; Thanks to Howard Eves]

1931 Dimitri Fjodorowitsch Jegorow died.

1948 Walther Mayer, the Austrian born mathematician who collaborated with Einstein on the theory of relativity, died in Princeton NJ at the age of 61.

## 11 September

1789 Alexander Hamilton appointed the first secretry of the U.S. Treasury. It is because of him that we did not adopt the English system of counting money, but a decimal system instead.

1798 Franz Ernst Neumann born. He formulated the law of electromagnetic induction [MT, Sept 83].

1831 After a four hour disputation in Latin, Jacobi was appointed professor at the University of Königsburg. While there he inaugurated what was then a complete novelty in mathematics—research seminars—assembling the more advanced students and interested colleagues. [DSB 7, 50]

1890 Felice Casorati died.

1940 Complex Computer demonstrates first remote computation.

## 12 September

1873 First typewriter.

1876 Johns Hopkins University, the first true graduate school in the U.S., formally opened its doors with an address—and without the benefit of a prayer—by the evolutionist T. H. Huxley. A Presbyterian minister wrote "It is bad enough to invite Huxley. It were better to have asked God to be present. It would have been absurd to ask them both." [Abraham Flexner, *Daniel Coit Gilman. Creator of the American Type of University*, pp. 84 and 87.]

1877 George Hamel born.

1906 Ernesto Cesàro died of injuries sustained while aiding a drowning youth. [DSB 3, 179]

1918 Maxime Bôchner died.

1959 The Soviet spaceship LUNA 2 was launched. It was the first spacecraft to land on the moon. Exactly eleven years later, LUNA 12 was launched. It was the first spacecraft to land on the moon, collect samples, and return to Earth.

## 13 September

1873 Constantin Carathéodory born. He worked on the calculus of variations and the theory of real functions. He is the only modern Greek mathematician "who does not suffer by comparison with the famous names of Greek antiquity." [DSB 3, 62]

1883 Opening of the University of Texas at Austin and Galveston. [Muller]

1885 Wilhelm Blaschke born.

1959 *Lunik II* hit the moon, being the first man-made object to do so.

2007 Closing date for a prize for a solution to Fermat's last theorem. Due to inflation the prize of one hundred thousand marks has long been worthless. See 27 June 1908.

## 14 September

1752 The Gregorian calendar adopted in Britain. See 3 September 1752.

1814 Francis Scott Key wrote "The Star-Spangled Banner."

1858 Henry Burchard Fine born in Chambersburg, Pennsylvania. After earning his Ph.D. in Germany he joined the Princeton faculty. He is responsible for building that department into a world class mathematics department. The mathematics building at Princeton is named in his honor. [DSB 4, 618].

1906 Franz Rellich born.

## 15 September

1739 Euler, in a letter to Johann Bernoulli, begins the general treatment of the homogeneous linear differential equation with constant coefficients. [See Ince, p. 534, for further references.]

1782 Lagrange, in a letter to Laplace, told of finishing his *Mécanique analytique.* Legendre undertook the editing of the work for the press. [Thanks to Howard Eves]

1846 George Boole, age 30, applied for a professorship at "any of her Majesty's colleges, now in the course of being established in Ireland." Although he had "never studied at a college" he had been a teacher for 15 years and was "familiar with the elementary and the practical as well as the higher Mathematics." Although he was self taught, the testimonies of DeMorgan, Cayley, and William Thomson showed that he was an accomplished mathematician. In August 1849, he was appointed the first professor of mathematics at Queen's College Cork. The reason for the long delay is unclear. [MacHale, *George Boole, His Life and Work*, pp. 75-84].

1855 Sylvester commenced his duties as professor of mathematics and lecturer in natural philosophy at the Royal Military Academy, Woolwich, and one of the richest research periods of his life began. [*Osiris*, 1(1936), 101]

1926 Jean-Pierre Serre born in Bages, France. In 1954 he received a Fields Medal for his work on the homotopy groups of spheres. He also reformulated some of the main results of complex variable theory in terms of sheaves. See *International Mathematical Congresses. An Illustrated History, 1893–1986*, edited by Donald J. Albers, G. L. Alexanderson and Constance Reid.

1947 ACM (Association for Computing Machinery) founded.

## 16 September

1494 Francesco Maurolico born.

1693 In a letter to John Locke, Newton apologized for ill thoughts that he had harbored against Locke. [Thanks to Howard Eves]

1848 Weierstrass came to the Catholic Gymnasium in Braunsberg, his third such position. That year he taught mathematics 19 hours per week, took over the geography class after Easter, and received a special note of thanks for helping out in gym! [From the annual report of the Gymnasium in the University of Louisville's Bullitt Collection of Mathematics. But see also DSB 14, 220]

1986 "Four out of three jocks can't count," read a headline in *The Harvard Lampoon*'s parody of *USA Today*.

## 17 September

1787 U.S. Constitution signed. Its format was influenced by the axiomatic approach of Euclidean Geogmetry. See ????  the date of the Gettysburg address, which was influenced by Non-Euclidean Geometry.

1802 Baron Georg von Vega (b. 1754), a military officer and mathematician famous for his military campaigns and his table of logarithms, was murdered for "his money and his watch." [Eves, *Adieu*, 257°; Muller]

1826 Georg Friedrich Bernhard Riemann born.

1908 Death of Thomas E. Selfridge, a 1903 classmate of Douglas MacArthur at West Point, whose tombstone at West Point reads "Gave up his life in the service of his country at Fort Myers, Virginia, September 17, 1908, falling with the first government aeroplane." The pilot, an Ohio bicycle maker named Orville Wright, survived. [Rick Atkinson, *The Long Grey Line* (1989), pp. 1–2]

1985 The *Los Angeles Times* reported that scientists at Chevron tested their new $10 million Cray X-MP supercomputer and discovered the $30^{\text{th}}$ Mersenne Prime and largest known prime, $2^{216,091} - 1$. [Part I, pp. 3, 19; *Mathematics Magazine* 59(1986), p. 182].

## 18 September

1752 Adrien-Marie Legendre born. He helped found the theory of elliptic functions.

1783 After having discussed the topics of the day, the Montgolfiers, and the discovery of Uranus, "He [Euler] ceased to calculate and to live," according to the oft-quoted words of de Condorcet. [Big Kline, 403, has the Julian date.]

## 19 September

1648 The theory of atmospheric pressure and the existence of a vacuum were confirmed by experiments designed by Blaise Pascal. [*Scripta Mathematica* 26(1963), p. 288]

1749 Jean-Baptiste Joseph Delambre born in Amiens, France. He conducted a geodetic survey between Dunkerque and Rodez which was instrumental in establishing the length of the meter. [DSB 4,15]

1783 The brothers Montgolfier repeated their experiment of 4 June 1783, in the presence of Louis XVI at Versailles. At one o'clock the crowd went wild as the balloon soared gracefully free carrying a rooster, a sheep, and a duck. See also 21 November 1783.

1894 "The purpose of mathematical logic is to analyze the ideas and reasoning that especially figure in the mathematical sciences," wrote Peano to Felix Klein. [DSB 10, 443]

1952 Otto Szasz died.

1966 Netherlands Antilles (Curaçao) issued four stamps honoring the seven liberal arts. The stamp for arithmetic and geometry pictures an abacus. Interestingly, logic is excluded from this series of stamps. [Scott #304–7]

## 20 September

1842 Alexander von Brill born.

1848 The American Association for the Advancement of Science met for the first time, in Philadelphia.

1887 Erich Hecke born.

1904 First circle flown, by Wilbur Wright. [Air & Space]

1916 The National Research Council met for the first time, in New York. President Woodrow Wilson founded it for "encouraging the investigation of natural phenomena" for American business and national security.

1930 Moritz Pasch died.

1939 Hermann Brunn died.

1948 John von Neumann gave his first lecture on the theory of automata. In this lecture, which was later published, he drew attention to the fundamental importance of the Universal Turing Machine. [A. Hodges, *Alan Turing. The Enigma*, p. 388]

1954 Harlan Herrick of IBM runs the first successful FORTRAN program.

## 21 September

1576 Girolamo Cardano died. One story says that it was by his own hand so as to fulfill his earlier astrological prediction of of his death on this date. [Eves, *Introduction to the History of Mathematics*, 221]

1781 Lagrange wrote d'Alembert "I begin to sense my 'force of inertia' growing little by little, and I am not sure that I will be able to pursue Geometry ten years from now. It seems also that the mine is almost too deep already, and that unless new seams [of ore] are discovered, it will be necessary to abandon it sooner or later." This pessimistic view that mathematics was drying up was shared by many in the late eighteenth century including Diderot, Buffon, and Voltaire. [Hawkins, *Jean d'Alembert*, p. 99].

1784 First U.S. daily newspaper began publication.

1984 *Science* reported (pp. 1379-1380) that Narendra Karmarkar of AT & T Bell Labs found a practical polynomial-time algorithm that is far faster than the simplex algorithm for linear programming problems. [*Mathematics Magazine* 58 (1985), p. 53].

## 22 September

1602 In a public address at Tübingen University, Michael Mastlin, Kepler's teacher, on the basis of chronological research put Jesus' birth more than four years before the conventional date of A.D. 1. This date is now generally accepted. [DSB 9, 168]

1636 From a letter by Fermat to Roberval, it is clear that Fermat conceived the idea of analytic geometry as early as 1629, yet he published nothing on the subject. [Struik, *Source Book*, p. 397]

1703 Vincento Viviani died. His problem of cutting four congruent windows in a hemispherical cupolo so that the remainder was quadrable led to Euler's development of the double integral.

1765 Paolo Ruffini born. He anticipated Abel by providing an almost corrrect proof of the insolubility of the quintic.

1791 Michael Faraday born. He was an English scientist and early experimenter with electricity.

1792 This date is considered the beginning of the Republican Calendar of France, for on this date the Republic was proclaimed and this was also the date of the autumnal equinox in that year. The new calendar was not officially approved until 5 October 1793. See Cecil B. Read, "A book printed in the year VII," *The Mathematics Teacher*, 59(1966), 138–140.

1822 "Jean-Françoise Champollion the younger wrote his famous *Lettre à Monsieur Dacier, secrétaire perpétuel de l'Académie royale des inscriptions et belles-lettres, relative à l'alphabet des hiéroglyphes phonétiques.* On that day he opened the great book of Ancient Egypt, sealed for some two thousand years and now at last decipherable." Quoted from p. 15 of *Tutankhamen* (1963) by Christiane Desroches-Noblecourt.

1949 The U.S. nuclear monopoly ended as the Soviet Union detonated its first atomic bomb.

## 23 September

1647 Descartes, on a visit on September 23-24 to France from Holland, met with Pascal. On this occasion Descartes may have recommended the experiment of noting the variation in the height of the barometer with altitude. [J. F. Scott, *The Scientific Work of René Descartes*, p. 6]

1768 William Wallace born.

1846 Johann Galle and Heinrich Louis d'Arrest discovered Neptune based on Urbain Leverrier's (1811–1877) calculations. Amazingly they found it the first night they looked. J. Adams (1819–1892) independently calculated the orbit. This marvelous feat based on a mathematical prediction really stirred up the scientific community. [DSB 1, 53, and 1, 295]

1877 Urbain Jean Joseph Leverrier died. [Muller]

1884 Patent filed for Hollerith tabulating machine. It was used in the 1890 census and became the model for computer cards.

1897 "Bourbaki is a pen name of a group of younger French mathematicians who set out to publish an encyclopedic work covering most of modern mathematics." So wrote Samuel Eilenberg in *Mathematical Reviews*, 3(1942), 55–56. He was the first to reveal in print that Bourbaki was a pseudonym—but the name was appropiated from a real general, Charles Denis Sauter Bourbaki, who died on this date at the age of 81. See Joong Fang, *Bourbaki*, Paideia Press, 1970, pp. 24, 27.

1948 Harvey Friedman born.

1983 *The Los Angeles Times* reported that David Slowinski of Cray research has found the $29^{\text{th}}$ Mersenne prime: $2^{132,049} - 1$. [*Mathematics Magazine* 57 (1984), p. 52]. See September 17, 1985.

## 24 September

1501 Girolamo Cardano born. Famous for his *Ars magna* of 1545, which contained detailed and systematics algebraic solutions to cubic and quartic equations. He was one of the most colorful figures in the whole history of mathematics, as is well illustrated in his autobiography, *The Book of My Life.*

1625 Jan de Witt born. This statesman for the Netherlands wrote, before 1650, one of the first systematic developments of the analytic geometry of the straight line and conics. It was printed in Van Schooten's second Latin edition of Descartes' geometry (1659–1661). See DSB 14, 465.

1651 Étienne Pascal died. The limaçon is named after him, and not after his famous son who later came blazing on the scene.

1801 Mikhail Vasilievich Ostrogradsky born.

1844 Max Noether born.

1894 Werner Rogosinski born.

1938 Hungary issued a stamp commemorating the $400^{\text{th}}$ anniversary of the founding of Debrecen College. George Maróthy (1715–1744) is pictured. [Scott #533].

1938 Lew Genrichowitsch Schnirelmann died.

## 25 September

1493 Columbus set sail on his second voyage to America.

1513 Balboa discovered the Pacific.

1644 Olaus Roemer, Danish astronomer, born. He was the first to measure the speed of light.

1654 Fermat writes to Pascaal defending his combinatorial method that Pascal had previously regarded as incorrect. [*Archive for History of Exact Science*, vol. 17, p. 237; Thanks to Kullman]

1777 Johann Heinrich Lambert died.

1819 George Salmon born.

1852  Christoph Guderman died.

1888  Stefan Mazurkiewicz born.

1944  Denmark issued a stamp commemorating the 300th anniversary of the birth of Ole Roemer, the astronomer who first measured the speed of light. [Scott #293].

1955  Franz Rellich died.

1959  Gregor Michailowitsch Fichtenholz died.

## 26 September

1766  Giulio Carlo Fagnano dei Toschi died. He is important for the identity

$$\frac{\pi}{4} = ln\Big(\frac{1-i}{1+i}\Big)^{i/2}$$

and for his rectification of the lemmiscate. [DSB 4, 515].

1868  August Ferdinand Möbius died. He discovered his famous strip in September 1858. Johann Benedict Listing discovered the same surface two months earlier. [DSB 9, 431]

1877  Herman Grassman died.

## 27 September

1830  American Statesman Charles Sumner (1811-1874) paid little attention as an undergraduate at Harvard, but a year after graduation he became convinced that mathematics was a necessary part of a complete education. To a classmate he wrote: "Just a week ago yesterday, I commenced Walker's Geometry, and now have got nearly half through. All those problems, theorems, etc., which were such stumbling-blocks to my Freshman-year career, unfold themselves as easily as possible now. You will sooner have thought, I suppose, that fire and water would have embraced than mathematics and myself; but, strange to tell, we are close friends now. I really get geometry with some pleasure. I usually devote four hours in the forenoon to it." Quoted from Florian Cajori's *Mathematics in Liberal Education* (1928), p. 115.

1879  Hans Hahn born.

1979  Department of Education established.

1987  Saint Vincent de Paul day. The devout Catholic, Augustin Cauchy was active in the Saint Vincent de Paul society, Irish relief, and homes for unwed mothers. [DSB]

## 28 September

551 B.C.  Birthdate of the Chinese philosopher and educator Confucius. His birthday is observed as "Teacher's Day" in memory of his great contribution to the Chinese Nation. His most famous aphorism is: "With education there is no distinction between classes or races of men."

490 B.C.  In one of history's great battles, the Greeks defeated the Persians at Marathon. A Greek soldier was dispatched to notify Athens of the victory, running the entire distance and providing the name and model for the modern "marathon" race.

1573  Italian painter and sculptor, Michelangelo Buonarroti, born.

1820  Friedrich Engels born in Germany.

1841  Friedrich Prym born.

1873  Birthdate of the American geometer Julian Lowell Coolidge. After an education at Harvard (B.A. 1895), Oxford (B.Sc. 1897), Turin (with Corrado Serge) and Bonn (with Eouard Study, Ph.D. 1904), he came back to Harvard to teach until he retired in 1940. He was an enthusiastic teacher with a flair for witty remarks. [DSB 3, 399]

1917  Richard Courant wrote to Nina Runge, his future wife, that he finally got the opportunity to talk to Ferdinand Springer about "a publishing project" and that things looked promising. See

24 November 1918 for the result. [Constance Reid, *Courant in Göttingen and New York. The Story of an Improbable Mathematician* (Springer 1976), p. 69]

1961 Erich Kamke died.

## 29 September

1801 Gauss's *Disquisitiones Arithmeticae* published. [Buhler, *Gauss*, p. 44].

1803 Charles Francois Sturm born. His theorem helps locate roots of polynomials.

1928 Erich Steinitz died.

1941 Friedrich Engel died in Giessen, Germany.

## 30 September

1717 Colin Maclaurin (1698–1746), age 19, was appointed to the Mathematics Chair at Marischal College, Aberdeen, Scotland. This is the youngest at which anyone has been elected chair (full professor) at a university. (Guinness) In 1725 he was made Professor at Edinburgh University on the recommendation of Newton. Cf. Sept. 1 1967.

1775 Robert Adrain born. Although born in Ireland he was one of the first creative mathematicians to work in America.

1810 The University of Berlin opened. Also listed as 15 October. Check it out.

1883 Ernst Hellinger born.

# OCTOBER

## 1 October

1386  University of Heidelberg founded. [Muller]

1658  The closing date for Pascal's prize problems on the cycloid. A toothache earlier that year caused him to return to mathematics and to study the cycloid. See 23 November 1654. [DSB 1, 53 and Boyer, p. 400].

1671  Guido Grandi born. He is noted for the roses that he introduced. His idea was to find a geometrical definition of curves which resemble flowers. These curves are still part of our calculus courses, except now we use polar coordinates to define them.

1907  Delegates from 310 Esperanto societies throughout the world met to elect a committee to modify the language. Louis Couturat, influenced by Leibniz's thought on the construction of a logical universal language, was elected one of the secretaries. [DSB 3, 456]

## 2 October

1667  Newton became a fellow at Trinity College, Cambridge. [Westfall, p. 179]

1759  "Your solution of the isoperimetric problems leaves nothing to be desired and I rejoice that this subject, with which I have been so completely occupied since my first efforsts, has been carried by you to such a high degree of perfection. The importnace of the subject has stimulated me to develop, aided by your lights, an analytical solution that I will keeep sectet as long as your own meditations are not published, lest I take away from you a part of the glory you deserve." So wrote Euler to the young Lagrange. See Allen Shields, "Lagrange and the *Mécanique Analytique*," *The Mathematical Intelligencer*, 10:4, Fall 1988, pp. 7– 10.

1937  The *London Illustrated News* had a picture of a wolf bone discovered in Czechoslovakia by Karl Absolom which has 55 notches in groups of 5, the first 25 being separated from the rest by one of double length. Dating from 30,000 BC, this is the earliest record of counting. [Bunt, Jones, Bedient, *The Historical Root of Elementary Mathematics*, p 2].

1955  The Electronic Numberical Integrator and Computer (ENIAC) retired. After disassembly, parts of this computer were shipped to the Smithsonian for display. [Goldstein, *The Computer from Pascal to von Neumann*, p. 234–5. See 30 June 1946]

## 3 October

1533  The mathematical mystic Michael Stifel predicted that on this date a chariot would touch down on a nearby hilltop and conduct him and his followers to heaven. His followers quit their jobs, but as the day approached they became sceptical. Stifel convinced the local constabulary to lock him in jail on the appointed date where he would be safe from his ruined, irate parishioners. See *Journal of Recreational Mathematics* 6 (1973), pp. 221–223, or Eves, *Circles*, 129°.

1842  Arthur Cayley admitted to fellowship at Trinity College Cambridge, at age 21—younger than any other fellow at the College. [*Works*, vol. 8, p. 29.]

1846  Sir John Herschel published John Couch Adams's prediction that a new planet (now called Uranus) existed and where to look for it. This provoked a priority controversy as the planet had already been found 23 September 1846 based on Leverrier's calculations. [DSB 1, 53]

1876  Johns Hopkins University opened.

## 4 October

1476  University of Copenhagen founded.

1833  First U.S. Railroad.

1903  John Atanasoff born. Together with Clifford Berry he designed the first electronic digital computer.

1934 "What the mathematician predicts today has a habit of becoming what the physicists find tomorrow." From the *London Times* as quoted in *Scipta Mathematica*, 7(1940), p. 58.

1957 *Sputnik I*, the first artificial earth satellite was placed in orbit by the Soviets—the Dawn of the Space Age. It traveled at a speed of 18,000 mph and circled the earth about every 95 minutes. The impact that *Sputnik* had on mathematics was unbelievable. The U. S. Government was convinced that the Russians were ahead of us in mathematics and science, so they poured money into the schools and into teacher retraining.

## 5 October

3761 B.C. Beginning of the Jewish calendar by Rabbi Hillel. [Muller]

1560 Death of Ferrari, quite possibly by poisoning at the hands of his own sister. Ferrari's solution to the quartic was published by Cardano in 1545 in his *Ars magna*. [Thanks to Gerald Lenz]

1582 The dates 5–14 October did not exist in Catholic countries due to the adoption of the Gregorian calendar. 15 October 1983 began the second year of the second 400 year cycle of that calendar. See 3 September 1752.

1713 Birthdate of Denis Diderot whose great *Encyclopedie* was published in 17 volumes of articles and 10 of splendid plates from 1751 to 1766. D'Alembert was editor for mathematical subjects. [DSB 4, 85–86]

1781 Birthdate of Bernard Bolzano. His "Rein analytischer Beweiss" of 1817 first formulated and proved the intermediate value theorem of the calculus. [DSB 2, 275]

1793 The French revolutionaries, in their anticlerical zeal, adopted the "calendar of reason." The year had twelve months, each with three weeks of ten days, plus five or six epagomenal days. The day was divided into 10 hours of 100 minutes each. The calendar lasted until January 1, 1806. See *Sky and Telescope*, vol. 64, December 1982, p. 533.

1853 Antioch College opened. It was the first nonsectarian college to grant equal scholastic opportunities to men and women. Horace Mann was the first president.

1861 Birthdate of Thomas Little Heath, whose main interest was Greek mathematics. *The Thirteen Books of Euclid's Elements*, which he published in 1908, is still in print by Dover. [DSB 6, 210]

1882 Robert H. Goddard, American physicist and rocket pioneer, born.

## 6 October

1570 Cardano imprisoned for 87 days on charges of impiety (casting a horoscope of Christ). He spent the remaining five years of his life in Rome under the eye of a suspicious pope who nonetheless gave him a pension. See "Girolamo Cardano's Horoscope of Christ," pp. 53–90 in *Renaissance Curiosa* by Wayne Shumaker, especially p. 55

1831 Richard Dedekind born.

1853 Antioch College opened in Yellow Springs, Ohio. It was the first non-sectarian school to offer equal opportunities to both men and women.

1942 Norway issued two stamps commemorating the bicentenary of the birth of the author of Johan Herman Wessel (1742–1785). [Scott #251-2].

## 7 October

1601 Baptisimal date of Florimond DeBeaune whose fame rests on two brief notes published in Schooten's Latin edition of Descartes (1649 and 1659–60). In the second of these he raised the first inverse tangent problem: determine a curve from a property of its tangent. [DSB 3, 615]

1864 The mathematical seminar at Berlin began. It was the oldest such seminar in Germany and the model for many others. Kümmer, Weierstrass, and Kronecker ran it. One of its goals was to improve teaching. [*ISIS* 66(1975), p 584.]

1893 When the poet/mathematician Omar Khayyam died in 1123 he was buried in a spot where the North wind would scatter rose petals over his grave. On this date a rose tree started from those

on Khayyam's grave was transplanted to the grave of Edward FitzGerald (1809-1883), the Irish translator who made Khayyam's poetry so famous in modern times. For Khayyam's geometric solution to the cubic see Eves, *Great Moments in Mathematics (before 1650)*, p. 155.

## 8 October

1662 Desargues born.

1834 Jakob Steiner appointed extraordinary professor at the University of Berlin, a post he held until his death in 1863. [DSB 13, 13]

1883 Professor Enoch Beery Seitz, of Missouri State Normal School, was "stricken by that 'demon of death.' typhoid fever, and passed the mysterious shades, to be numbered with the silent majority." "Prof. Seitz was in mathematics what Demosthenes was in oratory; Shakespeare in poetry; and Napoleon in war: the equal of the best, the peer of all the rest." In case you have never heard him, see the biography in the first volume (1894) of the *Americal Mathematical Monthly*, pp. 3–6.

1982 Shiing-shen Chern, director of the new Mathematical Sciences Research Institute in Berkeley, is interviewed about his mathematical background. See *The Two-Year College Mathematics Journal*, 14(1983), 370–376, for a summary of the interview.

## 9 October

1581 Birthdate of Claude-Gaspar Bachet de Méziriac, noted for his work in number theory and mathematical recreations. He published the Greek text of Diophantus's *Arithmetica* in 1621. He asked the first ferrying problem: Three jealous husbands and their wives wish to cross a river in a boat that will only hold two persons, in such a manner as to never leave a woman in the company of a man unless her husband is present. (With four couples this is impossible.) See DSB 1, 367.

1701 Yale College founded.

## 10 October

1845 Naval School (now Naval Academy) opened at Annapolis, MD.

1931 Spain issued a stamp picturing the Fountain of Lions at the Alhambra in Granada. Although not visible here, the Alhambra is famous for its use of tesselations. [Scott #491]

1940 Vito Volterra (1860–1940) died in Rome. Best known for his early contributions to functional analysis: he introduced the concept of functional in 1887. He also gave an example of a function with a bounded derivative that is not Riemann integrable. He took a prominent role in public life, being President of the Accademia dei Lincei and also a Senator. When the Fascists' came to power he opposed them and so lost his positions. Consequently his death was not announced in Italian newspapers. This had an ironic sequel: In October 1943 an SS detachment called at his house to arrest him and send him to a concentration camp. [HM 8 (1982), pp 90-92].

## 11 October

1675 Birthdate of Samuel Clarke, defender of Newton's physical theories against Leibniz.

1809 Gauss's wife Johanne died, following the birth of her third child Louis.

1852 Ferdinand Gotthold Max Eisenstein died of pulmonary tuberculosis at age 29. [DSB 4, 342]

1868 Thomas Alva Edison filed papers for his first invention, an electronic vote recorder to rapidly tabulate floor votes in Congress. Members of Congress rejected it.

1887 Patent #371,496 issued for the "comptometer," the first adding machine "absolutely accurate at all times." It was invented by Dorr Eugene Felt of Chicago; a model was constructed in 1884. It wasn't first.

## 12 October

1492 Columbus landed in West Indies, on San Salvador, probably now Watling Island. [Navy Facts,

p. 84]

1793 At the University of North Carolina, the cornerstone was laid for "Old East," the oldest state university building in the U.S.

1884 George Bruce Halsted presented his inaugural address before the Texas Academy of Science. He spoke of his teacher at Johns Hopkins, J./ J./ Sylvester, and related how the rumor started tht Sylvester killed a student when he was at the university of Virginia. [*Science*, 22 February 1885; vol. 1, no. 8, p. 265]

1894 George Bruce Halsted, president of the Texas Academy of Science, gave his inaugural address on "Original research and creative authorship the essence of University teaching." [AMM 1, 369]

## 13 October

2128 B.C. In China the earliest record of solar eclipse was made. See 6 April 648 B.C., and 4 June 780 B.C.

1597 Kepler replied to Galileo's letter of 4 August 1597 urging him to be bold and proceed openly in his advocacy of Copernicanism. [Eves, *Circles*, 159°]

1729 Euler mentioned the gamma function in a letter to Goldbach. In 1826 Legendre gave the function its symbol and name. [Cajori, *History of Mathematical Notations*, vol. 2, p. 271]

1884 An international conference in Washington D. C. decided "to adopt the meridian passing through the center of the transit instrument at the Observatory of Greenwich as the initial meridian for longitude." Greenwich Mean Time, or GMT, was born.

1890 Georg Feigel born in Homburg, Germany. At the University of Berlin he developed an introductory course, *Einführung in die Höhere Mathematik* (published, posthumeously, 1953) which was responsible for introducing the new fundamental concepts of mathematics based on axioms and structures into the universities. [DSB 4, 560].

1990 Hans Freudenthal, Professor Emeritus at Utrecht University, died, age 85.

## 14 October

1801 The blind Belgian physicist J. Plateau was born. Plateau's problem asks for the minimal surface through a given curve in three dimensions. A minimal surface is the surface through the curve with the least area. Mathematically the problem is still unsolved, but physical solutions are easy: dip a curved wire in a soap solution. The "soap bubble" that results is the minimal surface for that curve.

1806 The French, under Napoleon, defeated the Prussians in the Battle of Jena. Killed was the Duke of Brunswick, patron of Gauss.

1868 Padoa born.

1890 Birth of Dwight D. Eisenhower. In high school, the math teacher took away Ike's geometry book, telling him to work out the problems without benefit of the book. Eisenhower was told that unless the experiment was terminated by the teacher, he would receive an A+ in the course. "Strangely enough, I got along fairly well." Wrote Eisenhower later. [From *In Review: Pictures I've Kept* by Dwight D. Eisenhower, 1969, p. 7]. (Morris Bishop, in a footnote to his biography of Pascal, makes an even stronger claim; he says Eisenhower was told to "construct his own geometry".) [Thanks to Jerry Lenz]

1947 Captain Charles E. Yeager was the first pilot to exceed the speed of sound, flying the experimental Bell XS-1 rocket-propelled research plane at Mach 1.06 (700 mph or 1,127 kph) at 43,000 feet. Previously, many felt that turbulence would prevent planes from breaking the sound barrier. [Air & Space]

## 15 October

1608 Birthdate of Evangelista Torricelli. He succeeded his teacher, Galileo as professor of mathematics at Florence. One of his most amazing discoveries was a solid which had infinite length but

finite volume. He aso invented the mercury baromoter.

1783 The first manned ascension in a balloon. It carried Jean Pilatre deRozier 84 feet above the earth in a tethered flight. After the flight of September 19, 1783, Louis XVI forbade men to go aloft, making the adventurers furious. Later he extended the privilege to convicts, figuring they were expendable. de Rozier's loud fulmigations against such glory for "vile criminals" soon changed the king's mind. See November 21, 1783.

1810 The University of Berlin opened. Also listed 30 September. Check it out.

1846 First use of ether.

1846 Platon Sergeevich Poretsky born. In 1887–88, at Kazan University, he lectured on mathematical logic, being the first to do so in Russia. [DSB 11, 94]

1956 First FORTRAN reference manual.

## 16 October

1707 Roger Cotes elected first Plumian Professor of Astronomy and Experimental Philosophy at Cambridge at age 26. He is best known for his meticulous and creative editing of the second edition (1713) of Newton's *Principia*. He was also an important developer of the integral calculus. [Ronald Gowing, *Roger Cotes, Natural Philosopher*, p. 14]

1797 Gauss records in his diary that he has discovered a new proof of the Pythagorean Theorem. See Gray, *Expositiones Mathematicae*, 2(1984), 97–130.

1843 Hamilton discovered quaternions while walking along the Royal Canal in Dublin and immediately scratches the multiplication formulas on a bridge. Today a plaque on the bridge reads:

> Here as he walked by
> on the 16th of October 1843
> Sir William Rowan Hamilton
> in a flash of genius discovered
> the fundamental formula for
> quaternion multiplication
> $i^2 = j^2 = k^2 = ijk = -1$
> & cut it in a stone on this bridge.

## 17 October

1776 Euler read a paper to the St. Petersburg Academy of Science entitled "De quadratis magicis," in which he gave a method of constructing magic squares by means of two orthogonal Latin squares. See Peter Ullrich, "An Eulerian square before Euler and an experimental design before R. A. Fisher: On the early history of Latin squares," *Chance*, vol. 12, no. 1, Winter 1999, pp. 22–26.

1858 DeMorgan wrote about Euler's output. See *The American Mathematical Monthly*, 31(1924), 83–89 by W. W. R. Ball.

1873 J. S. Mill's *Autobiography* published five months and 10 days after his death. It had seven authors! See *Victorian Studies* 27(1983), 7–23.

1952 D. H. Lehmer, University of California, announced that $2^n - 1$ for $n = 2203$ and $2281$ are Mersenne primes. He was aided by a SWAC computing machine, the first result taking 59 minutes. [MT, 47(1954), 542]

1952 The California Supreme Court declared the state loyalty oath unconstitutional and declared that the eighteen faculty members who had refused to sign the oath be reinstated. One of those was the mathematician Pauline Sperry, who then became emeritus associate professor at Berkeley. For more on Sperry see *Women of Mathematics. A Biobibliobraphic Sourcebook*, pp. 217–219.

1956 The German Democratic Republic celebrated the 500$^{th}$ anniversary of Greifswald University by issuing a stamp picturing the seal of the university. [Scott #310].

1983 Gerard Debreu, who holds a joint appointment in Mathematics and Economics at Berkeley, won a Nobel Prize for his work in mathematical economics. For a non-technical description of his work see *The Mathematical Intelligencer*, 6(1984), no. 2, pp. 61–62.

## 18 October

1640 Pierre de Fermat (1601–1665) announced his 'little theorem' to Bernard Frenicle de Bessey in a letter. The theorem, which states that $n^{p-1} \equiv 1 \pmod{p}$ if $p$ is prime and relatively prime to n, was proved by Euler in 1736 by induction on $n$. [*Scientific American*, December 1982]

1867 Alaska ceded to U.S. by Russia.

1871 Death of Charles Babbage, computer pioneer. His obsession for mechanizing computation made him into an embittered and chrochety old man. He especially hated street musicians, whose activities, he figured, ruined a quarter of his working potential. [DSB 1, 354]

1921 Bohr introduced his quantum model of the atom.

1968 Robert Beamon of the U.S. Olympic team lifted the long jump record from 8.10 m (26 ft 6–7/8 in) to 8.90 m (29 ft 2–1/2 in), an increase of 9.9%. Since 1904 the record had crept up by 0.76 m in five increments. This phenomenal 0.80 m increase has incorrectly been attributed to the high altitude of Mexico City. It is probably due to Beamon's hitting the take-off board at top speed. See *Mathematics Magazine* 45(1972), 241–246 for a mathematical model and discussion.

1937 Chester F. Carlson (1906-1968) received a patent for the basic idea of electrophotography. This idea was developed by the Battell Memorial Institute and the Haloid Corporation into the xerographic (Greek for dry-writing) copying process. The first truly successful office copier was introduced in 1960. See "Struggling to become an inventor," by Dean J. Golembeski, *American Heritage of Invention & Technology*, 4:3 (Winter 1989), pp 8-15. See also 22 October 1938.

1952 The German Democratic Republic celebrated the 450$^{th}$ anniversary of the founding of Halle University in Wittenberg by issuing a stamp. [Scott #111].

## 19 October

1693 The University of Halle founded. [Muller]

1752 Franklin reported his kite/electricity experiment.

1965 The *London Times* reported that an archaeologist has located what he believes to be the tomb of Archimedes. [HM 5, 93]

1973 ENIAC patent invalidated.

## 20 October

1632 Christopher Wren, noted architect, born. In 1673 he was the first to rectify (find the arclength of one branch of) the cycloid. [DSB 14, 509]

1735 Benjamin Franklin's paper "On the Usefulness of Mathematics," appeared in the *Pennsylvania Gazette.* [NCTM yearbook # 32(1970), p. 20]

1958 Italy issued a stamp to celebrate the 350$^{th}$ anniversary of the birth of Evangelista Torricelli, mathematician and physicist. [Scott #754].

1975 The Public Record office in London released information on the Colossus, one of the first programmable electronic digital computers. It was built in 1943 for work on cryptography.

## 21 October

1805  British Admiral Nelson defeated the combined French and Spanish fleets in the Battle of Trafalgar by adopting the tactic of breaking the enemy line in two and concentrating his firepower on a few ships (orthodox tactics had the opponents facing each other in roughly parallel lines—the "line-ahead" formation). For an analysis of why this works see David H. Nash, "Differential equations and the Battle of Trafalgar", *The College Mathematics Journal*, 16(1985), 98–102.

1823  Birthdate of Enrico Betti. In algebra, he penetrated the ideas of Galois by relating them to the work of Ruffini and Abel. In analysis, his work on elliptic functions was further developed by Weierstrass. In "Analysis situs", his research inspired Poincaré, who coined the term "Betti numbers" to characterize the connectivity of surfaces. [DSB 2, 105].

1833  Alfred Nobel born. The well-known anecdote that there is no Nobel prize in mathematics as he thought Mittag-Leffler might win it seems to have no basis in fact. See *AMM* 91(1984), p. 382.

1845  After two unsuccessful attempts to present his work in person to the Royal Astronomer Sir George Biddell Airy, John Couch Adams left a copy of his calculation regarding a hypothetical planet at the Royal Observatory. Airy criticized the work and didn't search for the planet until later. Consequently he didn't discover Uranus. See 23 September 1846. [DSB 1, 53]

1879  First incandescent lamp.

1892  ( = 12 October O.S.) The 400$^{th}$ anniversary of the discovery of America was celebrated by a World's Fair at Chicago. On this date the grounds were formally dedicated. [*AMS Semicentennial Publications*, vol. 1, p. 74].

1914  Martin Gardner born in Tulsa, Oklahoma. From 1957 to 1980 he wrote the "Mathematical Games" column in *Scientific American*. Many of these columns have been collected together into the numerous books that he has written. If you want to know more about the person who has done more to popularize mathematics than any other, see the interview with Gardner in *Mathematical People. Profiles and Interviews* (1985), edited by Donald J. Albers and G. L. Alexanderson, pp. 94–107.

1965  Greece issued a postage stamp picturing Hipparchus and an astrolabe to commemorate the opening of the Evghenides Planetarium in Athens. [Scott #835].

1969  Wacław Sierpiński died in Warsaw. His grave carries—according to his wish—the inscription: Investigator of infinity. [Kuratowski, *A Half Century of Polish Mathematics*, p. 173; *Works*, p. 14]

1988  *Science* (pp. 374-375) reported that the 100-digit number $11^{104} + 1$ was factored by using computers working in parallel using a quadratic sieve method. [*Mathematics Magazine* 62 (1989), p 70].

## 22 October

1616  John Wallis born.

1746  Princeton chartered.

1850  Fechner's law introduced. [Springer's 1985 Statistics Calendar]

1908  First meeting of the Spanish Association for the Advancement of Science was held October 22–29. Sixteen papers were read in the section of mathematics. [BAMS 15, 317]

1938  In the back of a beauty shop in the Astoria section of Queens New York, Chester A. Carlson and his assistant Otto Kornei, conducted the first successful experiment in electrophotography. The message, "10.-22.-38 ASTORIA," was even less inspiring than Alexander Graham Bell's first phone conversation, but the effect was just as great. In 1949 Haloid Corporation marketed the Xerox Model A, a crude machine that required fourteen manual operations. Today five million copiers churn out 2,000 copies each year for every American citizen. Are you reading those you make? See 18 October 1937.

1983  The fourth World Computer Chess Championship began.

## 23 October

4004 B.C. The date of the creation of the world according to the computation of Archbishop James Usher (1581–1656), who had a curious fascination for the integration of numerology, astronomy, and scripture. It was highly regarded for several centuries primarily because in 1701 it was inserted into the margin of the King James version of the Bible. See *Sky and Telescope*, vol. 62, Nov. 81, 404–405.

526 Boethius executed. [Muller]

1852 August DeMorgan reported the conjecture of his student, Francis Guthrie: Four colors suffice to color planar maps so that adjacent regions have different color. It was solved by Kenneth Appel and Wolfgang Haken in 1976.

1871 Babbage's obituary appeared in the *Times of London*.

Today is Mole Day. It lasts from 6:02 a.m to 6:02 p.m and is named in honor of Avagadro's number ($6.02 cross 10^{23}$). For more information contact Maurice Ohler, National Mole Day Foundation, 1220 South 5th Street, Prairie Du Chien, Wis. 53821.

## 24 October

1601 Tycho Brahe died. Kepler inherited his vast accurate collection of astronomical data. He used this to derive his laws of planetary motion.

1676 Newton summarized the stage of development of his method in the "Epistola posterior," which he sent to Oldenburg to transmit to Leibniz. See 26 October 1676. [DSB 10, 46]

1821 Philipp Ludwig von Seidel born. He formulated the notion of uniform convergence. [Muller]

1826 Abel wrote Holmboë his impressions of continental mathematics and mathematicians.

1861 First transcontinental wire.

1902 In *Science*, George Bruce Halsted wrote that his student R. L. Moore, who had proved that one of Hilbert's betweenness axioms was redundant, "was displaced in favor of a local schoolmarm," Miss Mary E. Decherd. For the consequences of this overt criticism of the University of Texas, see 11 December 1902.

1904 Emmy Noether matriculated at the University of Erlangen. [Dick]

1989 "Welcome to the White House on this glorious fall day. I'm sorry if I'm just a little bit late. I was sitting in there trying to solve a few quadratic equations. [Laughter] Somewhat more difficult than balancing the budget, I might say. And then I thought it might be appropriate to have a moment of silence in memory of those substitute teachers back home. [Laughter]." Remarks by President George Bush (the father) at the Presentation Ceremony for the Excellence in Science and Math Teaching Awards.

## 25 October

1400 Geoffrey Chaucer died. Although rightly famous for his *Canterbury Tales*, he also wrote two astronomical works. [DSB 3, 217]

1666 W. Lilly, astrologer, was called before the House of Commons to explain the embarrassing success of his 1651 prediction of the plague (of 1665) and "exorbitant fire" of 1666. The House ultimately attributed the fire to the papists. [Ball, *Mathematical Recreations and Essays*, 6$^{\text{th}}$ edition, p. 390]

1713 Leibniz, in a letter to Johann Bernoulli, observed that an alternating series whose terms monotonically decrease to zero in absolute value is convergent. In a letter of January 10, 1714, he gave an incorrect proof (Big Kline, p. 461). Examination of the proof reveales that it is the one we give today, except he fails to say anything about the completeness of the reals.

1811 Evariste Galois born in the little village of Bourg-la-Reine, near Paris, France.

## 26 October

1676 Newton, through the intermediary of Oldenburg, wrote Leibniz concerning his work on the calculus. An anagram contained the statement of the problem of integrating differential equations. See 24 October ????

1825 First Erie Canal boat.

1893 Karl Pearson's first statistical publication. [Springer's 1985 Statistics Calendar]

## 27 October

1890 Olive Clio Hazlett born. She died 8 March 1974.

1904 New York subway opened.

1982 China's population exceeds one billion. The figure released on this date was 1,031,882,511.

## 28 October

1386 Opening of the University of Heidelberg. [Muller]

1462 Archbishop Adolph of Nassau captured the city of Maintz and allowed his soldiers to plunder the city. This forced Gutenberg and his printers to flee, but rather than nipping printing in the bud, it forced its spread to Strasburg, Cologne, Basel, Augsburg, Ulm, Nuremberg, Subiaco, and by 1470, Paris. [G. H. Putnam, *Books and Their Makers During the Middle Ages* (1896), p. 372].

1636 Harvard College founded. The only mathematical master's thesis in the U.S. before 1700 was at Harvard. This was in 1693 when the candidate took the affirmative position on "Is the quadrature of a circle possible?". [Eves, *Adieu*, 1°; also see Smith & Ginsburg, *History of Mathematics in America before 1900*] See November 26, 1609.

1886 The Statue of Liberty was dedicated on Bedloe's Island in New York Harbor. The sculptur Bartholin was present.

## 29 October

1465 Two printers from Mainz, who had moved to the monastery of Subiaco, about forty miles from Rome, issued Italy's first known book printed from movable metal type. It was Luctantius's *Institutiones divinae*. In 7 years they printed 29 different works in editions averaging 275 copies. Although Gutenberg published his bible at Mainz in 1455, this is the first dated book. For a nice treatment of early printed books see, *Incunabula and Americana* by Margaret Bingham Stillwell, 1930, p. 9.

1656 (?). Edmond Halley born.

1669 Newton, aged twenty-six, appointed Lucasian Professor at Cambridge. This post required Newton to lecture once each week on "some part of Geometry, Astronomy, Geography, Optics, Statics, or some other Mathematical discipline," and to deposit ten of those lectures in the library each year. The students were required to attend, but like all other requirements they ignored this one too. We know of only three people who attended a lecture at Cambridge by Newton. [Westfall 208–210; Works, 3, xv]

1675 Leibniz first used the integral sign. Also first used "d". He also constructed what he calls the "triangulum characteristicum," which had been used before him by Pascal and Barrow. [Cajori, *History of Mathematical Notations*, vol. 2, p. 2; Struik's *Source Book* mistakenly has 26 October]

1783 Jean d'Alembert died.

1878 Patent issued for Odhner calculating machine.

1929 The great stock market crash.

## 30 October

1613 Kepler married his second wife (the first died of typhus). She was fifth on his slate of eleven

candidates. The story that he used astrology in the choice is doubtful. [DSB, 7, 300]

1735 Ben Franklin published "On the Usefulness of Mathematics," his only published article on mathematics. See Eves, *Circles*, 317° for more about Franklin's mathematics.

1826 Abel presented a paper to the French Academy of Science that was ignored by Cauchy, who was to serve as referee. The paper was published some twenty years later. [DSB 1, 15]

1978 Laura Nickel and Curt Noll, eighteen year old students at Calalifornia State at Hayward, show that $2^{21,701} - 1$ is prime. This was the largest prime known at that time. See 9 February, 1979. [One of many historical notes in *The Nature of Modern Mathematics* by Karl J. Smith.]

1992 The Vatican announced that a 13-year investigation into the Catholic Church's condemnation of Galileo in 1633 will come to an end and that Galileo was right: The Copernican Theory, in which the Earth moves around the Sun, is correct and they errored in condemning Galileo. See the front page of the *New York Times* for 31 October 1992.

## 31 October

1815 Karl Weierstrass born, at Ostenfelde, Germany.

1903 At a New York meeting of the AMS F. N. Cole (1861- 1927) presented a paper "On the factoring of large numbers." He spoke not a word, but carefully raised 2 to the 67th power, then subtracted one. Moving over he computed 193,707,721 times 761,838,257,287. The calculations agreed, showing that $2^{67} - 1$ was not a Mersenne prime. E. T. Bell, in *Mathematics—Queen and Servant of the Sciences*, wrote, with his usual exageration, "For the first and only time on record, an audience of the American Mathematical Society vigorously applauded the author or a paper delivered before it." Later, in 1911, Bell asked Cole how long it had taken him to find this factorization and he replied "Three years of Sundays." It is instructive to check this arithmetic on your hand held calculator. [Eves, *Adieu*, 297°; BAMS 10(1903), 134]

1915 Closing date for a prize consisting of a gold medal bearing the portrait of Weierstrass and 3000 Swedish crowns for the best essay on the theory of analytic functions. King Gustav V of Sweden founded the prize to commemorate the centenary of the birth of Weierstrass. [BAMS 20, 40]

1918 The wife of the Russian mathematician Lyapunov died of tuburculosis. On the same day, Lyapunov shot himself. He died three days later, on 3 November 1918. [DSB 8, 560]

1952 The first hydrogen (fusion) bomb was exploded at 19:14:59.4 G.C.T. from a tower 20 feet above the Elugelab Atoll at the Eniwetok Proving Grounds in the Marshall Islands. [Kane, p. 46]

## Sometime in October

1839 Sometime in October 1830 the first teacher's institute was held at Hartford, Connecticut, 26 men teachers attended a six week course sponsored by Henry Barnard and received the "opportunity of critically reviewing the studies which they will be called upon to teach, with a full explanation of all the principles involved." The authority who gave instruction on higher mathematics was Charles Davies. [Kane, p. 634]

# NOVEMBER

## 1 November

1809 Louis Poinsot (1777–1859) named assistant professor of analysis and mechanics at the Ecole Polytechnique. In 1794 he was admitted to the first class at the university despite an insufficient knowledge of algebra. [DSB 11, 61]

1818 Whewell wrote John Herschel that he "would not be surprised if in a short time we were only to read a few propositions of Newton, as a matter of curiosity." See H. W. Becher, "William Whewell and Cambridge mathematics," *HSPS*, 11(1980), p. 15.

1844 "I am rather surprised that you expect clarity from a professional philosopher. Muddled concepts and definitions are nowhere more at home than among philosophers who are not mathematicians ... Just look aroung at today's philosophers, Schelling, Hegel, Nees von Esenbeck and Co. Don't their definitions make your hair stand on end? Or, in classical philosophy, read the kinds of things which "stars" like Plato and others (I except Aristotle) gave as explanations. Even Kant is often not much better: his distinction between analytic and synthetic propositions is, I believe, one of those which either turns on a triviality or is false." So wrote Gauss in a letter to Schumacher. [*The Mathematical Intelligencer*, **1**(1978), p. 18]

1884 The International Meridian Conference referenced mean solar time to the 24 standard meridians each of 15 degrees longitude. The international date line was then established to generally follow the 180th meridian in the Pacific Ocean. Previously Lewis Carroll had badgered officials with the question: Leave London at noon and travel with the sun directly overhead, returning the next day. When does the new day begin?

1891 Stanford University opened.

1951 Cuba commemorated the 30th anniversary of the winning of the World Chess title by José Raul Capablanca by issuing a stamp picturing the resignation play of Dr. Emanuel Lasker (1868-1941). [Scott #C44].

## 2 November

1815 George Boole born.

1825 Erie Canal opened.

1979 Krachian's ellipse algorithm for linear programming announced in *Science*.

1988 Computers in America went mad, thanks to a virus spread by graduate student Robert T. Morris Jr.

## 3 November

1832 "From nothing I have created another entirely new world." So said Janos Bolyai in a letter to his father Farkas when he told of his work on non-Euclidean geometry.

1906 Carl B. Boyer, historian of mathematics, born.

1957 Launch of Sputnik 2, carrying the dog, Laika, the first living creature to orbit the Earth. [Air & Space]

## 4 November

1744 Johann III Bernoulli born.

1879 The world's first cash register, "Ritty's Incorruptible Cashier", was patented by James Ritty, Dayton, Ohio. [*Ohio and Its Resources*, Ohio Chamber of Commerce, p. 27]

1952 UNIVAC I correctly predicts election results.

1960 The German Democratic Republic issued two stamps commemorating the 150th anniversary of the founding of Humboldt University, Berlin. [Scott #522-3].

1969 Pakistan issued a stamp honoring Alhazen (abū-'Alīal-Ḥasan ibn al-Ḥasan ibn al-Haytham) (965–c. 1040), astronomer and optician. Pictured is a diagram showing the reflection of light. [Scott #281].

## 5 November

1666 Leibniz received his doctor's degree at age 20 for his essay on a new method (the historical) of teaching law from the University of Altdorf in Nuremberg. He had studied law at his home town University of Leipzig, entering at 15, but left at 20 when he was denied his doctorate, officially on account of his youth. Altdorf offered him a professorship in law, but he declined. [Bell, *Men of Mathematics*, 122]

1804 Founding of the Universities of Moscow and Kasan.

1828 Augustus DeMorgan, age 22, gave his introductory lecture, "On the study of mathematics," at London University. It described the position which mathematics held in a person's education. DeMorgan was the first to hold the university's chair in mathematics, being chosen from 32 candidates, even though he was by far the youngest. See the chapter on DeMorgan in *A History of Mathematics Education in England* (1982), by. A. G. Howson [p. 82].

1932 Army defeats Harvard at football by a score of ??–??. After the game Harvard President A. Lawrence Lowell commented to West Point Superintendent Major General D. Connor that Harvard could easily beat West Point in an academic contest.

## 6 November

1766 Lagrange welcomed, at age 30, to the Berlin Academy by Frederick the Great. "The greatest king in Europe" whished to have at his court "the greatest mathematician of Europe."

1869 First intercollegiate football game. Who won?

## 7 November

1631 Transit of Mercury across the sun, the first observation of a transit of a planet, observed by Pierre Gassendi. This had been predicted by Kepler in 1629. [Scott, *Works of Wallis*, p. 191, had 1621]

1805 Lewis & Clark sighted Pacific.

1849 The official opening of Queen's College in Cork, Ireland. George Boole was the professor of mathematics—the only university post he ever applied for. [MacHale, *George Boole, His Life and Work*, p 88].

1915 In connection with the celebration of the centenary of his birth (31 October 1815), a memorial tablet was unvieled at his birthplace, Osterfelde, near Warendorf in Westphalia. It reads" "An dieser Stätt wurde am 31·X·1815 Karl Weierstrass, der grosse Mathematiker, eine Leuchte der Berliner Universität, geboren." [AMM 23(1916), 98]

1917 The "October Revolution" of the Bosheviks broke out in Russia. It is now celebrated on 7 November as the Gregorian calendar was not adopted there until 1918.

1940 "Galloping Gertie," suspension bridge over the Narrows of Puget Sound, Tacoma, Washington, breaks up from a torsional oscillation of steadily increasing amplitude caused by the wind known as the von Karman vortice street. The film is instructive for classes in Differential Equations.

## 8 November

1656 Edmund Halley born. He is best known for his accurate prediction that the comet of 1682 would return in 1758.

1837 Mount Holyoke Female Seminary, the first college founded exclusively for women, starts classes with 80 students, each paying $64 per year for tuition and board.

1868 Birthdate of Felix Hausdoff, pioneer set theorist.

1952 Gino Fano died in Verona, Italy. This geometer created a finite geometry that is now a common classroom example.

## 9 November

1752 William Braikenridge, British mathematician and theologian, elected to the Royal Society. He was mainly interested in plane curves. [DSB 2, 418]

1885 Hermann Weyl born. He wrote "One may say that mathematics talks about the things which are of no concern to man. Mathematics has the inhuman quality of starlight—brilliant, sharp, but cold. ... thus we are clearest where knowledge matters least: in mathematics, especially number theory." [*AMM*, 1951, p. 523]

1956 The German Democratic Republic issued a stamp commemorating the 110th anniversary of the Carl Zeiss Optical Works in Jena. Pictured is Ernest Abbe, whose theoretical work in optics greatly benefited the company. [Scott #311].

1957 France issued the world's first postage stamp with a portrait of Newton. [Scott #861].

## 10 November

1619 Descartes has a dream that gave him the initial hint that led to the discovery of analytic geometry. [See Eves, *Circles*, 174°]

1872 Stanley found Livingstone.

1918 A marble monument to Tartaglia (1499-1557) was unveiled at Brescia, his birthplace. [AMM 27(1920), 421]

1951 Several "largest" prime numbers are announced in *Nature* (p. 838). For the previous 75 years, $2^{127} - 1$ was the largest known prime. Edouard Lucas discovered it. Look them up.

## 11 November

1572 Tycho Brahe first observed a supernova in the constellation Cassiopeia. It provided important evidence to support the Copernican hypothesis. See DSB 2, 402.

1675 In a manuscript Leibniz struggled with the product and quotient rules for differentiation. At first he thought $d(uv) = du\,dv$. [Big Kline, p. 376]

1729 Birthdate of Louis Antoine de Bougainville. Although he began as a mathematician (under d'Alembert's influence he wrote the first textbook on the integral calculus in 1752), he became famous as an explorer. He was the first Frenchman to sail around the world. But he was no great navigator, in spite of his mathematical ability. [DSB 2, 342]

1918 Armistice Day. At the eleventh hour of the eleventh day of the eleventh month World War I ended.

1954 Algeria issued a stamp honoring Saint Augustine of Hippo (354–430). He is best remembered for his quote about mathematicians being in league with the devil. [Scott #261].

1979 Greg Maggs and Robert Kolstad complete the world's longest slide rule. It is 323 feet long and 9.5 inches wide and is located in the University of Illinois College of Law building, Champaign. [Guinness]

## 12 November

1733 Abraham DeMoivre privately presented to some friends the normal distribution curve. [*School Science and Mathematics*, vol. 62, p. 172 and Smith, *Source Book*, p. 566. Thanks to Kullman]

1802 The United States Military Philosophical Socienty was founded at West Point. Jonathan Williams, nephew of Benjamin Franklin and superintendent of the Academy was the first president. Members received an attractive certificate bearing a scene of the destruction of the Roman fleet at Syracuse by means of Archimedes' mirror and the motto "Scientia in bello pax" (The use of science in war leads to peace).

1861 U.S. exported first oil to Europe.

1906 "The unique strength of Cambridge, as a place of experimental research, and as a leader in the advancement of Science generally, has depended greatly on the mathematical foundations given a large portion of all the undergraduates by the mathematical Tripos." So wrote William Thomson, by then Lord Kelvin. See H. W. Becher, "William Whewell and Cambridge Mathematics," *HSPS*, 11(1980), p. 15.

1936 Alan Turing's paper "On computable numbers, with an application to the entscheidungsproblem" published.

1969 The German Democratic Republic issued two stamps honoring the 550$^{th}$ anniversary of Rostock University. [Scott #1150-1].

## 13 November

354 Saint Augustine of Hippo born. He wrote: "The good Christian should beware of mathematicians and all those who make empty prophecies. The danger already exists that mathematicians have made a covenant with the devil to darken the spirit and confine men in the bonds of Hell." See D. W. Robinson, "From pebbles to commutators," *American Scientist*, 55(1967), no. 3, pp. 329–337. [DSB 1, 333]

1711 Joseph Addison wrote in *The Spectator* (#221): "Those who are versed in the Philosophy of Pythagoras, and swear by the *Tetrachtys*, that is, the number Four, will know very well that the number *Ten*, which is signified by the letter X, (and which has so much perplexed the town) has in it many particular powers; that it is called by platonick writers the complete number; that One, Two, Three and Four put together make up the number Ten, and that Ten is all. But there are not mysteries for ordinary readers to be let into. A man must have spent many years in hard study before he can arrive at a knowledge of them." [Thanks to Smoryński]

1883 Although he was only three years old at this time a spectacular meteor shower is responsible for Hubert Anson Newton being better known as an astronomer than as a mathematician. At age 25 he was Professor of Mathematics at Yale (and the only Democrat on the faculty). He was vice-president of the AMS at the time of his death in 1896. See DSB 10, 41.

1884 The London Mathematical Society awarded its first DeMorgan Medal to Arthur Cayley who "has invented and worked out the theory of invariants, and in steady life-long work connected it with nearly every branch of mathematics, enriching everything he touches, and everywhere throwing open new vistas of future work." [*Mathematical Intelligencer* 6, no. 4, p. 8]

1930 Pluto discovered.

1957 Gordan Gould, a 37-year-old Columbia University graduate student, leaped out of bed at 1 a.m. to begin furiously scribbling notes for the world's first laser (his acronym for Light Amplification by Stimulated Emission of Radiation). It took 20 years of legal battles to receive his "candy store patent," so called because he had his notebook notarized in a candy store. [UPI press release, Nov. 12, 1982]

## 14 November

1716 Leibniz died. His only mourner was his secretary, and an eye witness wrote: "He was burried more like a robber than what he really was, the ornament of his century."

1949 France issued stamps honoring Voltaire and the Comte de Buffon (1707-1778). [Scott #B239, B241].

1954 Alice Liddle Hargraves died, age ??? She was the Alice of *Alice's Adventures Underground*.

1972 For the first time in its 76-year history, the Dow Jones Industrial Stock Average closed above 1000.

## 15 November

—— French law allows the first taste of Beaujolais Nouveau on this date each year. In 1985 the law was changed to the third Thursday in November. Also permission was granted to ship the

wine ahead of time to bonded warehouses outside of France. Thus in the US we can drink the Nouveau on the same day as the French.

1738 Sir William Herschel, English astronomer, born. [Wadsworth]

1747 "Clairaut, at a public session of the [French] Academy, announced in rather pompous phrases that the Newtonian Theory of gravity was false!" Euler and d'Alembert simultaneously came to the same conclusion as all had been working on the motion of the moon as a special case of the three body problem. See 17 May 1749.

1783 At the Paris Academie des Sciences, Etienne de Montgolfier discusses in mathematical terms the problem of navigating balloons. [DSB 9, 492]

1793 Birthdate of Michel Chasles, historian of mathematics. From 1861 to 1869 he was the victim of the clever and prolific literary forger, Denis Vrain-Lucas, who sold him thousands of fake manuscripts including some of Newton and Pascal. [DSB 3, 214]

1819 Founding of the Cambridge Philosophical Society.

1957 Brazil issued a stamp commemorating the centenary of the death of Auguste Compte, French mathematician and philosopher. [Scott #854].

## 16 November

1823 Birthdate of Jakob Amsler inventor, in 1854, of the polar planimeter, a device for measuring areas enclosed by plane curves. [DSB 1, 147]

1835 Eugenio Beltrami born. In 1868 he showed the consistency of non-Euclidean geometry by providing a model of it on the pseudosphere, a surface with constant negative curvature. See DSB 1, 599.

## 17 November

1717 While making his rounds a gendarme found an infant on the steps of the Church of Saint Jean-le-Rond in Paris. The child was christened Jean-le-Rond. Later, for unknown reasons, he added the surname d'Alembert. [Eves, *Circles*, 217°]

1790 Möbius born.

1879 John Wesley Young born. His 1923 report, *The Reorganization of Mathematics in Secondary Education*, profoundly influenced educational thought and practice. [DSB 14, 559]

1921 Fisher reads his famous Royal Society paper. [Springer's 1985 Statistics Calendar]

1930 Kurt Gödel's "On formally undecidable propositions of *Principia Mathematica* and related systems I" was received for publication. It contained the amazing result that there are true but unprovable statements in arithmetic.

## 18 November

2349 B.C. Noah's flood began according to the English naturalist William Whiston (1667–1752) who felt it was caused by a comet which passed over the equator causing extensive rains. [Claire L. Parkinson, *Breakthroughs*, p. 131]

1812 Jean Victor Poncelet (1788–1867), a military engineer, was captured while Napoleon's army was retreating from Moscow. He profited from this enforced leisure (until his release in June 1814) by resuming his study of mathematics. While there he did important work on projective geometry. See DSB 11, 76.

1883 At noon on this day the telegraphic time signals sent out daily from the Naval Observatory at Washington, D.C., were changed to standard time, a system adopted on the initiative of the American Railway Association. Standard time was suggested for the U.S. in 1869 by Charles Ferdinand Dowd, a schoolmaster from Saratoga, N.Y., but was not adopted then. He suggested dividing the continent into four time zones each one hour or fifteen degrees of longitude wide. Standard Railroad Time had four time zones, Eastern, Central, Western, and Pacific. Congress

made these official in 1918. Some citizens grumbled about "railroad tyranny" and tampering with "God's time." See *New York Times*, 20 Nov. 1983. See April 1, 1967.

## 19 November

1954 The first automatic toll collector was placed in service at the Union Toll Plaza on the Garden State Parkway of New Jersey. [Kane, p. 669]

1982 *Science* has an article describing Friedman's version of Kruskal's theorem. The important thing is that this is a mathematical (rather than metamathematical) statement independent of arithmetic.

## 20 November

1711 Robert Simson submitted to a simple test of his mathematical knowledge and was duly admitted as professor of mathematics at the University of Glasgow. His most influential work was a definitive edition of Euclid's *Elements* in 1749. [DSB 12, 446].

1792 Nikolai Ivanovich Lobachevsky born.

1843 G. Ascoli born.

## 21 November

1783 The first manned free balloon flight, launched by the brothers Montgolfier, carried Jean Pilatre de Rozier and the Marquis d'Arlandes on a flight that wafted across Paris for 25 minutes, reached a height of 500 feet and traveled five and a half miles. The Montgolfier brothers had unmanned launches on June 5 and September 19, 1783. Among the onlookers was Benjamin Franklin, American emissary to the court of Louis XVI. When asked of what use is ballooning, Franklin replied with emphatic simplicity, "Of what use is a newborn baby?" [Air & Space, vol. 1, p. 72 and Williams, p. 43]

1785 William Beaumont, pioneer American army surgeon, born.

1811 Gauss to Bessel: "One should never forget that the functions, like all mathematical constructions, are only our own constructions." Big Kline, p. 1032.

1877 Thomas Edison announced the invention of what he called "The Talking Machine"—the phonograph.

1963 Denmark and Greenland issued almost identical stamps to commemorate the $50^{\text{th}}$ anniversary of the atomic theory of Niels Bohr (1885–1962). [Scott #409-410 and #57-58 respectively].

1964 The Verrazano-Narrows Bridge, linking the boroughs of Brooklyn and Staten Island in New York City, opened. From 1964 to 1981, it was the world's longest suspension bridge, with a main span of 1298 meters.

1973 Mexico issued a stamp portraying an Aztec calendar stone and another with the mathematician and astronomer Carlos de Siguenza y Gongora (1645–1700). [Scott #C417-8].

1983 A special purpose computer built by Lee Sallows generated the following self-documenting pangram (it contains each letter of the alphabet and what it asserts about itself is true): This pangram contains four a's, one b, two c's, one d, thirty e's, six f's, five g's, seven h's, eleven i's, one j, one k, two l's, two m's, eighteen n's, fifteen o's, two p's, one q, five r's, twenty-seven s's, eighteen t's, two u's, seven v's, eight w's, two x's, three y's and one z. See *Scientific American*, October 1984, p. 26.

## 22 November

1850 Sylvester called to the Bar. Rather than practicing law he gave private instruction in mathematics, and counted among his pupils Florence Nightingale. [*Osiris*, 1(1936), 102]

1963 President John F. Kennedy assassinated.

## 23 November

1654 From 10:30 to 12:30 in the evening Pascal experienced a religious ecstasy that called him to give

up his intermittent interest in mathematics and to devote his time to religious contemplation. [*Scripta Mathematica* 26(1967), 296] See 1 October 1658.

1823 Janos Bolyai wrote to his father "I have made such wonderful discoveries that I am myself lost in astonishment." This refers to his discovery of Non-Euclidean Geometry that was published in 1833. [Kline, *Mathematics. The Loss of Certainty*, p. 83]

1982 Vatican City issued a set of three stamps commemorating the 400th anniversary of the Gregorian Calendar. Pictured is a detail from the tomb of Pope Gregory XIII showing him surveying the globe. [Scott #715-7].

1982 Poland issued stamps honoring the mathematicians Stanisław Zaremba (1863–1942), Wacław Sierpiński (1882–1969), Zygmunt Janiszewski (1888–1920), and Stefan Banach (1892-1945). [Scott #2542-5].

1983 The Vatican issued three stamps honoring Christopher Clavius (1537–1614).

## 24 November

1639 Transit of Venus first observed by Jeremiah Horrocks.

1759 Lagrange wrote Euler that he believes that he had developed the true metaphysics of the calculus; at that time he seems to have been convinced that the use of infinitesimals was rigorous. Lagrange attempted to prove Taylor's theorem (the power of which he was the first to observe) and then to develop the entire calculus from it. (Cajori, *History of Mathematics*, 257)

1789 Lagrange finished his *Mécanique analytique.* [Muller]

1836 A total lunar eclipse occurred which Gauss had promised to show, through the observatory telescope to his friend Ribbentrop, confirmed bachelor, campus eccentric, and absent-minded professor of law. Although it was pouring rain that evening Ribbentrop appeared. Gauss explained that observation was impossible, but Ribbentrop countered, "No, I have my umbrella." [Eves, *Squared*, 191°]

1864 So as not to miss a lecture, George Boole walked the three miles from his home in Ballintemple to Queen's College in Cork, Ireland, in a pouring rain. He lectured in wet clothes, caught a cold, and died two weeks later at age 49. See 8 December. [MacHale, *George Boole, His Life and Work*, p 24].

1858 Dedekind discovers his cuts and thereby provides the first correct definition of continuity. [Dauben, p. 48]

1888 On Thanksgiving Day, six members of the mathematics department at Columbia University met to form a society for the purpose of discussing mathematics and reading papers of mathematical interest. A month later they christened it the *New York Mathematical Society*. By 1894 the society had attained a national character, so its name was changed to the *American Mathematical Society*. The six were J. H. Van Amring, the first president, Thomas Scott Fiske, Rees (a professor), Jacoby and Stabler (fellow students with Fiske) and Maclay (a graduate student). [P. Duren (ed), *A Century of Mathematics in America*, vol. I, pp. 5, 13].

1918 Richard Courant sat down with Ferdinand Springer and signed a contract for the series of books now famous as the "Yellow Series." [Constance Reid, *Courant in Göttingen and New York. The Story of an Improbable Mathematician* (Springer 1976), p. 72]

1982 Sweden issued five stamps honoring Nobel Prize winners Niels Bohr, Erwin Schrodinger, Louis de Broglie, Paul Dirac and Werner Heisenberg. [Scott #1425-9].

## 25 November

1658 The prize committee for Pascal's cycloid problems (see 1 October 1658) decided not to give the prize of sixty Spanish gold doubloons to anyone. [DSB 7, 583]

1731 Euler, in a letter, introduced the letter $e$ as the base for the natural logarithms ("$e$ denotat numerum, cuius logarithmus hyperbolicus $= 1$"), though he may have used the notation in his

manuscripts as early as 1727. [*Osiris* 1(1936), 489].

1907  First general meeting of the Warsaw Scientific Society. Among the 14 founders of the Society were the two mathematicians Samuel Dickstein (1851–1939) and Władysław Gosiewski (1844–1911). [Kuratowski, *A Half Century of Polish Mathematics*, p. 17]

1915  Albert Einstein completed his general theory of relativity. [A. Hellemans and B. Bunch, *The Timetables of Science*, p 429].

1952  Portugal issued two stamps commemorating the centenary of the birth of the mathematician Francisco Gomes Teixeira (1851-1932). [Scott #751-2].

1963  The German Democratic Republic issued a stamp picturing a letter sorting machine. For the mathematics of such a machine see, Joe Gallian, ??? [Scott #678].

## 26 November

1607  John Harvard, founder of Harvard College, born in London. Harvard, the oldest university in the U.S., was named for him in 1639. See Oct. 28, 1636.

1789  President George Washington proclaimed Thanksgiving day the first national holiday, acknowledging the nation's "many and signal favors of Almighty God."

1864  Charles Dodgson gives Alice Liddell (rhymes with "fiddle") a hand-printed copy of *Alice's Adventures under Ground*, a work he wrote for her. This was reproduced by Dover in 1965. See 4 July 1862.

1894  Norbert Wiener born.

## 27 November

1701  Birthdate of the Swedish astronomer Anders Celsius. In 1742 he popularized a thermometer with a 100-degree scale. As fixed points he chose the freezing and boiling points of water, calling them 100 and 0 respectively. In 1747 the present system with the scale reversed was introduced. Around 1800 people started calling this the Celsius Thermometer. [DSB 3, 174]

1727  Isaac Greenwood began his "private" lectures as Hollis Professor of Mathematics and Natural Philosophy at Harvard. These lectures were given to selected students and required parental permission, probably to insure payment of the attendance fee of forty shillings. [I. B. Cohen, *Some Early Tools of American Science*, p. 35].

1754  The mathematics tutor Abraham de Moivre succumbed, at the age of 87, to lethargy. He was sleeping twenty hours a day, and it became a joke that he slept a quarter of an hour more every day and would die when he slept the whole day through. [DSB 9, 452]

1875  Johns Hopkins University offered J. J. Sylvester $5000 a year plus moving expenses to assume the mathematics professorship. He set three conditions under which he would accept: The sum be paid in gold, the university provide a residence, and that he be allowed to appropriate student fees. Only the first was acceptable to the university, but Sylvester agreed when the offer was increased to $6000 in gold. Shortly after arriving he founded the *American Journal of Mathematics*. In 1883 he left to become Savilian professor of geometry at Oxford. See K. A. Jacobs, "The Hopkins Four," *Johns Hopkins Magazine*, July 1974, 17–26.

1979  *The New York Times* in an article entitled "Soviet mathematician is obscure no more," reported on Leonid Khachiyan, the 27-year-old discoverer of a polynomial-time algorithm for linear programming. [*Mathematics Magazine* 53 (1980), p 119].

1984  Binion's Horseshoe Casino announced that a Texan, known only as "Tom," lost $1 million on a single roll of the dice and "acted like it was nothing." He won $770,000 on a single roll in 1980 and $538,000 earlier this year, so he is still ahead. Is this a good way to gamble? [AP Press Release]

## 28 November

1660  After attending a lecture by Christopher Wren, a group gathered to discuss the founding of "a

college for the promoting of physico-mathematical experimental learning." The result was the Royal Society of London. [DSB 14, pp. 371 and 510]

1977 Charles Babbage Institute incorporated.

1984 From Karen E. Oleson's bulletin board: $(\text{Meal})^2 + \pi = 4\text{U2B}$ Thankful. [MT 77, p. 592]

## 29 November

1803 Birthdate of Johann Doppler after whom an "effect" in acoustics and optics is named.

1929 Byrd over South Pole.

1960 Digital Equipment Company (DEC) announces the PDP-1, the first computer with a video display terminal.

## 30 November

1703 Newton made president of the Royal Society, an office he held until his death. [DSB 10, 83]

1712 William Jones elected fellow of the Royal Society. In 1706 he introduced the Greek letter $\pi$ for the ratio of the circumfrence of a circle to a diameter in his book *Synopsis palmariarum matheseos* (1706). This title is hard to translate. Literally it means a synopsis of the palm leaves of mathematics. Thus it is a compendium of the most praisworthy parts of mathematics. Earlier William Oughtred (1647) and Isaac Barrow (1669) used the same symbol for twice the number. The symbol was not generally used in our sense until Euler, who adopted it in 1737, popularixed $\pi$ in his *Introductio in analysin infinitorum* of 1748. See DSB 7, 163, and "The ubiquitous $\pi$ " by Dario Castellanos, *Mathematics Magazine* 61(1988), 67–98, especially p. 91.

1753 Benjamin Franklin received the Copley Medal, the highest honor of the Royal Society of London, for his "curious experiments and observations on electricity." He was the first American to receive the Copley Medal. Three years later he was elected a member of the Royal Society. [Kane, p. 367; DSB 5, 130]

1877 Luigi Bianchi received his degree in mathematics. His work on metric differential geometry found application in Einstein's studies on relativity. [DSB 2, 121]

1967 Ireland issued two stamps to commemorate the tercentenary of the birth of Jonathan Swift, author of *Gulliver's Travels*. If you have read this book, then you know why this entry is included here; if you haven't, then you should, and then you would. [Scott #240-241].

# DECEMBER

## 1 December

1783 J. A. C. Charles was the first man to see the sun set twice in one day. He did it by making a flight (to 9000 feet) in a hydrogen balloon.

1947 G. H. Hardy died—on the same day that the Copley Medal was to be presented to him by the Royal Society of London. [*Collected Papers of G. H. Hardy*, vol. 1, p. 8].

1962 Iraq issued a stamp honoring the Arab philosopher Abū Yūsuf Ya'qūb ibn Isḥāq Al-Ṣabbāḥ al-Kindī (c. 813–c. 870). [Scott #303].

## 2 December

1792 Nikolai Ivanovich Lobachevsky born. He was one of the three founders of Non-Euclidean Geometry, and one of the few mathematicians who has had a song written about him— by Tom Leherer.

1831 Birthdate of du Bois-Reymond.

1942 At 3:36 p.m. in a squash court under the West Stands of Stagg Field (the abandoned football stadium) at the University of Chicago, the first self-sustaining nuclear (fission) reaction took place. Enrico Fermi (1901–1954) was leader of the Manhattan Project. [DSB 4, 582].

1967 Italy issued a postage stamp to commemorate the $25^{th}$ anniversary of the first atomic chain reaction. Pictured is Enrico Fermi at Los Alamos and a model of the first Atomic Reactor. [Scott #976].

1978 *Science News* reports, p. 390, that $2^{21,701} - 1$ is prime.

1982 At 4:09 AM, after $5\frac{1}{2}$ hours of surgery by Dr. William DeVries, a Jarvik-7 artificial heart replaced the diseased heart of Barney B. Clark, who lived 112 days with his artificial heart, the first ever. [*New York Times*, 2 December 1987]

## 3 December

1610 Galileo dedicates his *Sidereus nuncius* to grandduke Cosmos II. [Muller]

1833 Oberlin College, the first truly coeducational institution of higher education in the U.S., opens with 29 men, 15 women.

1924 Birthdate of John Backus, inventer of FORTRAN.

1958 Germany issued a stamp to commemorate the $500^{th}$ anniversary of the Cusanus Hospice at Kues, founded by Cardinal Nicolaus (1401- 1464), Nicolaus Cusanus (Nickolaus Krebs). [Scott #792].

## 4 December

1409 The University of Leipzig established. [Muller]

1679 Philosopher Thomas Hobbes died, thus ending his 25 year feud with John Wallis over Hobbes's attempt to square the circle in 1655. It began when Hobbes called Wallis's *Arithmetica Infinitorum* a "scab of symbols". [DSB 14, 152]

1980 Ireland issued a stamp picturing Robert Boyle (1627-1691) and his 1659 Air Pump. [Scott #492].

## 5 December

1492 Columbus discovered the island of Santo Domingo.

1610 Benedetto Castelli, a former student of Galileo, wrote him, that if Copernicus was correct, Venus should sometimes appear "horned" and sometimes not. See 11 Dec. 1610.

1776 The first scholastic fraternity in America, Phi Beta Kappa, was organized at William and Mary College in Virginia.

1825 Abel wrote how delighted he was that Crelle was starting a new mathematics journal, for it meant he would now have a place to publish his researches. The first volume contained seven papers by Abel. [DSB 1, 14]

1883 Sylvester, in Baltimore, received a cable containing the single word "Elected," informing him of his appointment as Savilian Professor of Geometry at Oxford. This ended his seven year stay at Johns Hopkins. [*Osiris*, 1(1936), 150]

1890 Harold Jacoby, later head of the Department of Astronomy at Columbia University, proposed at a meeting of the New York Mathematical Society that they publish a bulletin. In October 1891, the first issue of the *Bulletin of the New York Mathematical Society, A Historical and Critical Review of Mathematical Science* appeared.

1933 Prohibition repealed.

1965 First Ph.D. degree in computer science awarded. To whom? Where?

1979 Iran issued a stamp commemorating the 600$^{\text{th}}$ anniversary of the death of the mathematician Ghyath-al-din Jamshid Kashani. He is pictured with an astrolabe in the background. [Scott #2042].

## 6 December

1592 Galileo delivered his inaugural lecture at Padua. [Muller]

1682 Birthdate of Giulio Carlo Fagnano dei Toschi, who was born in Sinigaglia, Italy. He was the founder of the geometry of the triangle, studied the lemniscate, and coined the term "elliptic integral." See DSB 4, 515–516.

1830 First national observatory (Naval Observatory) established at Washington, D.C. [Naval Facts, p. 100]

1917 Kazimierz Kuratowski gave a talk "On the definitions in mathematics," which became his first published paper. This work grew out of Jan Łukasiewicz's crushing criticism of the foundations of Stanisław Zaremba's *Theoretical Arithmetic* (1912). Kuratowski's now famous 1921 definition of ordered pair also grew out of Łukasiewicz's critique. [Kuratowski, *A Half Century of Polish Mathematics*, p. 24]

???? Birthdate of Nicolette Weil, daughter of the mathematician André Weil. She was born on St. Nicholas' day, as he planned, or so he jokingly claimed, but she is named after Nicolas Bourbaki. Professor Weil was one of the founders of the Bourbaki group. See Joong Fang, *Bourbaki*, Paideia Press, 1970, p. 40.

1956 The knapsack problem was first named and discussed by George B. Dantzig, the father of linear programming. [*AMM* 93 (1986), 672].

1963 *Time* magazine published a copy of Salvador Dali's "Fifty abstract pictures which as seen from two yards change into three Lenines masquerading as Chinese and as seen from six yards appear as the head of a royal tiger." It is based on the semi-regular tessellation 4–3–4–3–3 made up of squares and triangles.

2005 At a book signing after a mathematics professor at West Point was asked what he taught, former president Jimmy Carter commented "In retrospect, I possibly received the best insight into human nature by studying differential equations and systems of differential equations. That subject seemed to interrelate rates of change between interconnected entities."

## 7 December

1823 Leopold Kronecker born of prosperous Jewish parents at Leignitz, Prussia. "Die ganzen Zahlen hat der liebe Gott gemacht, alles andere is Menschenwerk." (God made the integers, all else is Man's work). So said Kronecker in 1886.

1830 Birthdate of the Italian geometer Antonio Luigi Gaudenzio Guiseppe Cremona. [DSB 3, 467]

1873 Cantor wrote Dedekind that the "aggregate" of real numbers is uncountable. Five days earlier he wrote that he "had never seriously concerned himself with the problem, since it seemed to

have no practical value." [Dauben, 51; DSB 3, 54]]

1867 Marie Curie, Polish physicist, born.

1877 Edison's phonograph demonstrated.

1928 Linguist Noam Chomsky born.

1948 The first transistor is developed at Bell Labs. See 10 July 1973.

1972 *Apollo 17*, the last (as of 1990) manned moon flight was launched.

## 8 December

1632 Albert Girard died. He introduced the abbreviations sin, tan, and sec for the trigonometric functions. See DSB 5, 409.

1864 George Boole died from a feverish cold, or perhaps pneumonia, he got after walking two miles from his home in Queen's College at Cork, Ireland, in a drenching rain to teach his class. [Eves, *Circles*, 289°]

1831 "Prof. Noether's lectures (she is a woman—a member of a noted mathematical family) are also excellent ... Prof. Noether thinks fast and talks faster. As one listens, one must also think fast—and that is always excellent training. Furthermore, thinking fast is one of the joys of mathematics." Saunders MacLane, then a student at Göttingen, to his mother. See *Emmy Noether, A Tribute to Her Life and Work*, ed. by James W. Brewer and Martha K. Smith.

1947 Eckert-Mauchly computer company incorporated.

1948 Prudential Insurance signs a contract to buy a UNIVAC I.

## 9 December

1667 William Whiston born. In 1701, Newton arranged for Whiston to succeed him as Lucasian professor. In 1710 he was deprived of the chair and driven from Cambridge for his unorthodox religious views (it is not acceptable to be a unitarian at the College of the Whole and Undivided Trinity). [DSB 14, 295]

1793 Noah Webster established the first daily newspaper, *The American Menerva*, in Minerva? New York City.

1906 Grace Hopper born.

1911 Henri Poincaré wrote the editor of a mathematical journal if, contrary to custom, an unfinished piece of work could be published. He explained that at his age he may not be able to finish it, but that his work might provide ideas for another. The paper was published and not long after this "unfinished symphony," George David Birkhoff (1884–1944) completed the solution. Poincaré died suddenly on 17 July 1912. [Eves, *Squared*, 173°; Bell, *Men of Mathematics*, p. 553].

1960 Sperry Rand Corporation of St. Paul, Minnesota, announced the first electronic computer to employ thin-film memory, the UNIVAC 1107. Its operational speed was measured in billionths of a second (nanoseconds), compared to speeds in most other computers of millionths of a second (microseconds). Memory could be accessed more than a million times a second. [Kane, p. 190]

## 10 December

1269 The Flemish Dominican Willem van Moerbeke completed the first translation of the works of Archimedes into Latin. [E. J. Dijksterhuis, *Archimedes*, p. 38]

1478 The Treviso Arithmetic, the first printed mathematics text, published. An English translation by David Eugene Smith was published by Frank Swetz as *Capitalism & Arithmetic. The New Math of the 15*th *Century* (1987). [Smith, *Source Book*, p. 1]

1672 In a letter to Collins, Newton described a method of drawing tangents to curves whose equations are polynomials in $x$ and $y$. If the curve is given by $f(x,y) = 0$, this amounts to computing the

slope as

$$-\frac{\partial f/\partial x}{\partial f/\partial y} = \frac{dy}{dx}$$

[Rigaud, *Letters of Scientific Men*, vol. 2, p. 339; Thanks to David Kullman]

1701 Newton resigned his Lucasian professorship at Cambridge, having been at the mint since 1696. [DSB 10, 45]

1797 Napoleon, in a conversation with Laplace, Lagrange and other members of the French Academy, called attention to *La geometria del compasso* (Pavia, 1797) by Lorenzo Mascheroni (1750–1800). In this book Mascheroni showed that all of the constructions of Euclidean geometry can be carried out with compass alone. This work had a practical origin: constructions made with a compass alone are more accurate than those which use a straightedge. The book is dedicated to Napoleon, who is praised as liberator of Northern Italy. [Rademacher and Toeplitz, *The Enjoyment of Mathematics*, p. 203].

1804 Carl Jacobi born. He introduced the "Jacobian" in 1841.

1815 Computer pioneer Augusta Ada Byron born.

1869 Wyoming became the first state to grant women suffrage. [See 26 August 1920].

1896 Albert Nobel died. Nobel prizes are awarded on this date each year in Stockholm (except the Peace Prize which is awarded in Oslo). There is an unfounded anecdote that there is no prize in mathematics as Nobel feared Mittag-Leffler would win it.

1928 The Netherlands issued a stamp with a portrait of Christiaan Huygens. [Scott #B36].

## 11 December

1610 Galileo composed the cypher "The mother of love emulates the figures of Cynthia" to "copyright" his claim that Venus had phases like the moon. This idea, which may have been cribbed from a student, provided the first hard evidence that the earth revolved around the sun. See 5 Dec. 1610. For the historical debate on this possible plagiarism, see *Science News*, Nov. 26, 1983, p. 347.

1719 The first aurora borealis display recorded in America took place in New England: "This evening, about eight o'clock, there arose a bright and red light in the E.N.E. like the light which arises from a house on fire (as I am told by several credible people who saw it, when it first arose) which soon spread itself through the heavens from east to west, reaching about 43 or 44 degrees in height, and was equally broad." [Kane, p. 49]

1860 Charles Dodgson and Alice Liddle met Queen Victoria.

1884 Hilbert passes his Ph.D. orals. [Reid's *Hilbert*, p. 16]

1902 The University of Texas fired George Bruce Halsted. When asked why Halsted was fired, an Austin lawyer responded: "Well, Halsted just had more intelligence than the remainder of the faculty, taken together, and they just couldn't stand it." See D. Reginald Traylor, *Creative Teaching: Heritage of R. L. Moore* (1972), pp. 34-37.

1950 Astronomer Leslie John Comrie, who had no claim to be a mathematician, "showed how to 'program' commercial machines for scientific computation; developed impeccable interpolation techniques; produced mathematical tables of the highest standards of accuracy and presentation; and, in effect, created computational science." For this work he was elected F. R. S. a few months before his death on this date. DSB 3, 373.

## 12 December

1885 In the midst of his inaugural lecture at Oxford, Sylvester "refreshed" the audience with his sonnet "To a missing member of a family group of terms in an algebraical formula." [*Osiris*, 1(1936), 109; *Nature* 33, 7 Jan 1886, p. 228; *Collected Mathematical Papers*, vol. 4, p. 293]

1901 Guglielmo Marconi received the first transatlantic wireless communication, the three code dots

signifying the leter "S." Already well-known, Marconi, at twenty-seven, became world- famous overnight. [DSB 9, 98]

1941  Emil Picard, 85, died in Paris. He had been permanent secretary of the French Academy of Sciences since 1917.

1991  The first web server in America was installed on an IBM mainfraim by Paul F. Kunz, a physicist at the Stanford Linear Accelerator Center. Tim Berners-Lee wrote the software and installed the world's first web server at CERN, the European Organization for Nuclear Research, in December 1990.

## 13 December

——  In the twentieth and twenty-first centuries this is a Friday-the-thirteenth if and only if the year is congruent to 3, 8, 14 or 25 modulo 28. Can you find a similar rule for each of the other months?

1769  Dartmouth College received its charter.

1907  Emmy Noether received her Ph.D. degree, *summa cum laude*, from the University of Erlangen, for a dissertation on algebraic invariants directed by Paul Gordan. She went on to become the world's greatest woman mathematician. [DSB 10, 137 and A. Dick, p. xiii]

1913  "Unthinkable as it now seems, there were no crossword puzzles until the newspaperman Arthur Wynne's simple Word Cross appeared . . . on the 'Fun' page of The New York World Sunday Magazine." [*New York Times Book Review*, 8 July 1984, p. 17] Should this be 21 December?

1943  Croatia issued a pair of stamps to honor the Serbo-Croation mathematician and physicist Fr. Rugjer Boscovich (1711–1787). [Scott #59-60].

## 14 December

1503  The astrologer Nostradamus is born. [Muller]

1799  George Washington died, according to an old mnemonic, "in the last hour of the last day of the week, in the last month of the century." Unfortunately for this saying, the eighteenth century had one more year to go. [P. 330 of S. H. Killikelly, *Curious Questions*, vol. 2, 1968]

1893  The American, Dorothea Klumpke defended her thesis on Saturn's rings for a doctorate in mathematics at the Sorbonne, before an expectant gathering of professors and several hundred spectators. "Your thesis," said one of the examining professors during the awards ceremony, "is the first which a woman has presented and successfully sustained with our faculty to obtain this degree. You worthily open the way." Indeed she did, for she became a distinguished astronomer. [*Sky & Telescope*, August 1986, pp. 109–110. Reprinted in *AWM Newsletter*, **17**, no. 5, p. 12-13.]

1911  "So we arrived and were able to plant our flag at the geographical South Pole. God be thanked!" From the diary of the Norwegian explorer, Roald Amundsen, the first person to reach the South Pole. He was accompanied by four companions and fifty-two sled dogs. [See 15 January 1912].

1946  Denmark issued a stamp commemorating the 400th anniversary of the birth of the mathematician and astronomer Tycho Brahe. [Scott #300].

1981  The *New Yorker* carried a long interview with Marvin Minsky, tracing his biography and the development of artificial intelligence. [*Mathematics Magazine* 55(1982), p. 245].

1986  Dick Rutan and Jeana Yeager begin a nine day trip around the world without refueling in the airplane *Voyager*. [A. Hellemans and B. Bunch, *The Timetables of Science*, p. 599].

## 15 December

1742  Euler gave the first clear statement of the fundamental theorem of algebra: every algebraic equation of degree n has exactly n complex roots. Imprecise statements of the result were given earlier by Peter Rothe (1608) and Albert Girard (1629). Incorrect proofs were given by d'Alembert (1746), Euler (1749), Foncenex (1759), Lagrange (1772) and Laplace (1795), but a

correct proof (and the name) had to await Gauss's doctoral dissertation of 1799, who discovered it in the fall of 1797 when he was 20. [Smith, *Source Book*, p. 292]

1802  Janos Bolyai born.

1887  *Nature* quotes J. J. Sylvester: "Perhaps I may, without immodesty, lay claim to the appelation of the mathematical Adam, as I believe that I have given more names (passed into general circulation) to the creatures of the mathematical reason than all the other mathematicians of the age combined." [p. 162]

1928  To commemorate the International Congress of Medicine at Cairo, Egypt issued a postage stamp picturing Imhotep (c. 3000 BC). [Scott #153].

1965  First manned rendezvous in space, between *Gemini VI* and *Gemini VII* astronauts.

## 16 December

1627  Cavalieri announced to Galileo and Cardinal Borromeo that he had completed his *Geometria*, which contains his method of indivisibles, now known as Cavalieri's principle. [DSB 3, 149]

1799  Gauss wrote Wolfgang Bolyai that he was sorry they had not discussed the theory of parallels during their student days together at Gottingen (1796–1798). [G. E. Martin, *Foundations of Geometry and the Non-Euclidean Plane*, p. 306]

1861  Weierstrass, who for twelve years had endured painful attacks of vertigo, suffered a complete collapse of his health due to overwork. Henceforth, he always lectured while seated, consigning the blackboard work to an advanced student. Nevertheless, he eventually became a recognized master teacher. [DSB 14, 220–221]

1941  Pope Pius XII declared Albertus Magnus the patron of all who cultivate the natural sciences. [DSB 1, 99]

1970  *Venera 7*, first successful Venutian soft-landing probe, lands on Venus.

## 17 December

1797  Joseph Henry, American physicist, born.

1903  The Wright brothers flew their first plane at Kitty Hawk.

1941  V. Frederick Rickey born.

1969  Egypt issued a stamp to publicize the International Congress for Scientific Accounting which began in Cairo on this date. Pictured are ancient arithmetic and modern computer cards. [Scott #815].

## 18 December

1799  Jean Etienne Montucula, historian of mathematics, died. [Muller]

1957  The first nuclear power plant in the United States goes on line.

## 19 December

1783  Birthdate of Charles-Julien Brianchon who, in 1820 published the nine-point circle theorem. Although this theorem has been independently discovered many times he gave the first complete proof and coined the phrase "nine-point circle". [DSB 2, 455]

1894  Karl Pearson introduced the Pearson family of densities. [Springer's 1985 Statistics Calendar]

1908  *Scientific American* offered a $500 prize for a simple explanation of the fourth dimension.

## 20 December

1623  Wilhelm Schickard, in a letter to Kepler, described his calculating machine. [Dauben, *A Selective Bibliography*, p. 251]

1648  Thommaso Ceva born.

## 21 December

1620 The Pilgrims aboard the Mayflower went ashore for the first time at what is now Plymouth, Massachusetts.

1671 Newton proposed for membership in the Royal Society of London by Seth Ward. See 11 January 1672. [Koyre, *Newtonian Studies*, p. 40]

1754 Louis-Bertrand Castel, vociferous opponent of Newtonian science, gave a demonstration of his ocular harpsicord, which corresponded colors with the musical tones. [DSB 3, 115]

1807 Joseph Fourier announced to the French Academy of Science that an arbitrary function could be expanded as an infinite series of sines and cosines (we now call them Fourier series). Many members of the Academy, including Lagrange, considered this pure nonsense. [M. Braun, *Differential Equation and Their Applications*, Springer, p. 485; thanks to J. Spielman].

1878 Jan Łukasiewicz born.

1893 Scientist Pierre and Marie Curie discovered radium.

1913 The first crossword puzzle was published, in the Sunday supplement of the *New York World*.

1946 The Detroit news reports the Purdue yell, "*E* to the *X*, *DY*, *DX* — *E* to the *X*, *DX* — Cosine, Secant, Tangent, Sine — Three Point One Four One Five Nine — Square Root, Cube Root, BTU — Slipstick, Slide Rule, Yea Purdue." [MT, vol. ??, p. 401]

1968 Integrated circuits used in the guidance computer of the Apollo spacecraft.

—— The winter solstice occurs on this date about half of the time. In 1983 it occured at exactly 10:30 UT on December 22.

## 22 December

1666 First meeting of the Académie des Sciences in Paris. [Muller]

1669 "In a dark night, in bed, without pen, ink or paper or anything equivalent, I did by memory extract the square root of 30000,00000,00000,00000,00000,00000,00000,00000, which I found to be 1,73205,08075,68077,29353, feré, and did the next day commit it to writing." John Wallis in a letter to Thomas Smith of Madalene College. See "Arithmetical prodigies" by E. W. Scripture, *American Journal of Psychology*, 4(1891), 38.

1765 Johann Friedrich Pfaff born in Stuttgart, Germany. Laplace, when asked who the greatest mathematician in Germany, replied, Pfaff. When the questioner said he should have thought Gauss was, Laplace replied: "Pfaff is the greatest mathematician in Germany; but Gauss is the greatest in all Europe." [Quoted from Cajori, *A History of Mathemtics*, in AMM 8(1901), p. 26]

1819 Birthdate of Pierre-Ossian Bonnet whose favorite field was differential geometry, a field opened by Euler, Monge, and Gauss, but lacking systematic treatment when Bonnet took it up in the 1840s. [DSB 2, 288]

1869 Birthdate of Dimitry Fedorovich Egorov, who worked mainly in function theory [DSB 4, 287].

## 23 December

1690 Flamsteed observes Uranus, but doesn't recognize it as undiscovered planet.

1751 Jacobi called this the birthday of elliptic functions because on this day a work by the Italian mathematician Giulio Carlo Fagnano, which had been sent to the Berlin Academy, was handed to Euler for review. The study of this work led Euler to his important investigations on elliptic integrals and to the discovery of the addition theorem. [Cajori, *Historical Introduction to Mathematical Literature*, p. 213)

1763 Price read Bayes's essay to the Royal Society.

1867 Death of Jean Victor Poncelet.

1947 First transistor made.

1981 The Computer Museum in Boston incorporated.

1986  Walter Kaufmann-Bühler died at the age of 42. He was the mathematics editor of Springer-Verlag and never gave up his first love—mathematics. That made him an extraordinary editor. [See *MI*, ???? ].

1987  Egypt issued a stamp honoring the mathematician Ali Mustafa Mousharafa (1898–1950). [Scott #1147].

## 24 December

1819  Bernard Bolzano was dismissed from his theological chair at the University of Prague and put under police supervision for his unorthodox religious views. In mathematics he helped remove the scandal of infinitesimals from the calculus. [DSB 2, 273–4]

1822  Charles Hermite born. He proved the transcendence of $e$ in 1873.

2011  The date on which, according to the Mayan calendar, the present world is supposed to end with a flood. [Moffatt, *The Ages of Mathematics*, vol. 1, pp. 22–23; Thanks to Kullman]

## 25 December

1642  Isaac Newton born. See 5 January 1643.

1656  Huygens (who was a bachelor) spent Christmas Day making the first model of a pendulum clock. [*Janus*, 46(1957), p. 79].

1758  Halley's comet first sighted after he predicted its return. After Newton explained planetary motion, he suggested that comets could have elongated elliptical orbits. Halley's comet has eccentricity 0.9675. [*UMAP Journal*, 4(1983), p. 162]

## 26 December

1532  Xylander, translator of Euclid and Diophantus, born. This Greek name was the pseudonym of Wilhelm Holzmann. [Muller]

1791  Charles Babbage born.

1837  Charles Babbage completed his "Calculating Engine" manuscript.

1861  Frederick Engle born in Germany. He became the closest student of the Norwegian mathematician Sophus Lie. Engle was also the first to translate Lobachevsky's work into a Western language (German). [DSB 4, 370].

1898  Radium discovered by Pierre and Marie Curie.

1951  Kurt Gödel delivered the Gibbs Lecture, "Some Basic Theorems on the Foundations of Mathematics and their Philosophical Implications," to the annual AMS meeting at Brown University.

## 27 December

1612  Galileo observed Neptune, but did not recognize it as a planet. This observation is important in that it has recently led to the conjecture that a tenth planet exists. See *Scientific American*, September 1980, p. 90.

1725  First meeting of the Royal Academy of Science in St. Petersburg. [Muller]

## 28 December

1903  John von Neumann born.

1923  George David Birkhoff of Harvard received the first Bocher Memorial Prize for his paper "Dynamical systems with two degrees of freedom." [BAMS 30(1924), 193]

1938  Kurt Gödel lectures to the annual AMS meeting, Williamsburg, on the consistency of the axiom of choice and the generalized continuum hypothesis. Independence was proved in 1963 by Paul Cohen. [Dawson]

1973  For a really big ellipse, consider the orbit of the comet Kahoutek, which reached perihelion on this date. The length of the major and minor axes are 3,600 and 44 Astronomical Units. One

Astronomical Unit is equal to the Earth's mean distance from the sun, approximately 92,600,000 miles. The comet's eccentricity is approximately 0.99993. [*UMAP Journal*, 4(1983), p. 164]

## 29 December

1256  Birthdate of Ibn Al-Banna who studied the magic properties of numbers and letters. [DSB 1, 437]

1566  A part of Tycho Brahe's nose was cut off in a duel with another Danish nobleman. The dispute was over a point of mathematics. This he replaced with a prosthesis generally stated to be of silver and gold but containing a high copper content. [DSB, 2, 402]

1692  Huygens, in a letter to L'Hospital, gave the first complete sketch of the folium of Descartes. Although the curve was first discussed 23 August 1638 no complete sketch had previously been given due to a reluctance to use negative numbers as coordinates.

1856  Birth of Thomas Jan Stieltjes, who did pioneering work on the integral.

1891  Leopold Kronecker died of a bronchial illness in Berlin, in his 69$^{\text{th}}$ year.

1947  George Dantzig announced his discovery of the simplex method at the joint annual meeting of the American Statistical Association and the Institute of Mathematical Statistics. The lecture was poorly attended and the result attracted no interest. See Robert Dorfman, "The discovery of linear programming," *Annals of the History of Computing*, 6(1984), 283–295, esp. 292.

## 30 December

1691  Deathdate of Robert Boyle, president of the Royal Society of London. [Muller]

1881  The "Four Fours" problem was first published in *Knowledge* a magazine of popular science edited by the astronomer Richard Proctor. The problem is to express whole numbers using exactly four fours and various arithmetical signs. For example $50 = 44 + 4 + \sqrt{4}$. This can be done for the integers from 1 to 112, but 113 is a problem. For references see *536 Puzzles & Curious Problems*, by Henry Ernest Dudeney (Edited, 1967, by Martin Gardner).

1897  Stanisław Saks born.

1902  Leornard Eugene Dickson married Susan Davis. Later he often said of his honeymoon: "It was a great success, except that I only got two research papers written." In all he published 18 books and hundreds of articles. [J. Gallion, *Contemporary Abstract Algebra*, p. 277; DSB 4, 82]

1947  The British mathematician and philosopher Alfred North Whitehead died in Cambridge, MA.

1952  Harvard mathematician Andrew Gleason received a $1000 prize for solving a problem in abstract geometry which had baffled mathematicians for 52 years.

## 31 December

1610  Ludolph van Ceulen, fencing master and mathematics instructor, died. Using the classical method and polygons with $2^{62}$ sides, he computed the value of $\pi$ to 35 decimal places. Needless to say, this took most of his life. This decimal approximation of $\pi$ is inscribed on his tombstone in St. Peter's churchyard in Leyden in the Netherlands. The number $\pi$ is still sometimes referred to as "the Ludolphine number." See DSB 3, 181.

1915  The Mathematical Association of America was founded in Columbus, Ohio. Starting with 1045 charter members, the Association now has some 34,000 members who are interested in the improvement of mathematical instruction at the collegiate level.

1924  Hubble announced the existence of distant galaxies.

1930  Jaime Escalante born.

1987  The last minute (UT) of the last hour of the last day of the year 1987 carried an extra second, a leap second. This was to coordinate the slowdown in rotation of the Earth on its axis, or Solar Time, with the more precise atomic time. The one-second insertion was made at 6:59:59 P.M.

at the Naval Obseervatory in Washington D.C. Just exactly when the proverbial man-in-the-street choose to insert this second was his own business, but in New York's Times Square it was done with much hoopla at midnight. From the U.S. Naval Obsertatory's "Stargazing Notes for December 1987."