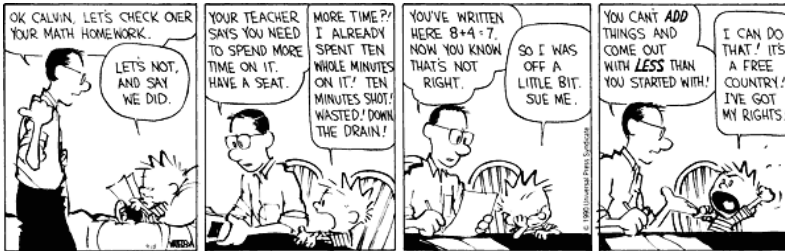
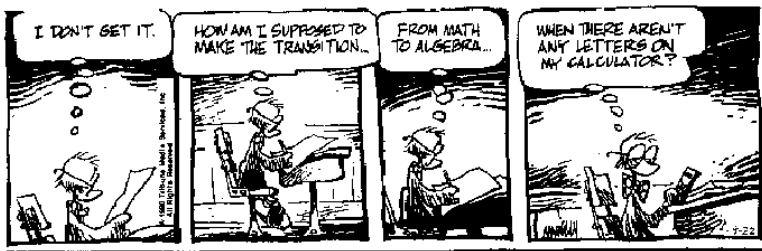
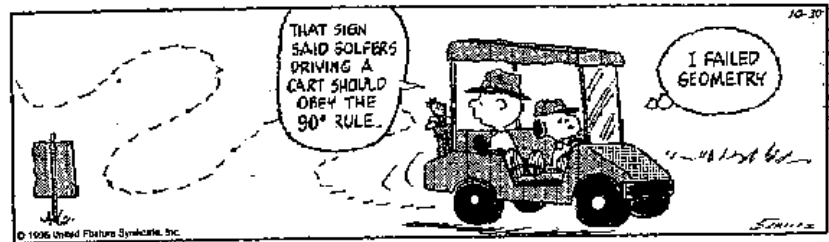




$$x^4 - 8188x^3 + 25139294x^2 - 34301407052x + 17549638999785 = 0$$



PEANUTS By Charles M. Schulz



53	1	S	(1803) Guglielmo LIBRI Carucci dalla Sommaja (1878) Agner Krarup ERLANG (1894) Satyendranath BOSE (1912) Boris GNEDENKO	
	2	S	(1822) Rudolf Julius Emmanuel CLAUDIUS (1905) Lev Genrichovich SHNIRELMAN (1938) Anatoly SAMOILENKO	
1	3	M	(1917) Yuri Alexeievich MITROPOLSHY	
	4	T	(1643) Isaac NEWTON	
	5	W	(1838) Marie Ennemond Camille JORDAN (1871) Federigo ENRIQUES (1871) Gino FANO	
	6	T	(1807) Jozeph Mitza PETZVAL (1841) Rudolf STURM	
	7	F	(1871) Felix Edouard Justin Emile BOREL (1907) Raymond Edward Alan Christopher PALEY	
	8	S	(1888) Richard COURANT (1924) Paul Moritz COHN (1942) Stephen William HAWKING	
	9	S	(1864) Vladimir Adreievich STELKOV	
	2	10	M	(1875) Issai SCHER (1905) Ruth MOUFANG
		11	T	(1545) Guidobaldo DEL MONTE (1707) Vincenzo RICCATI (1734) Achille Pierre Dionis DU SEJOUR
12		W	(1906) Kurt August HIRSCH	
13		T	(1864) Wilhelm Karl Werner Otto Fritz Franz WIEN (1876) Luther Pfahler EISENHART (1876) Erhard SCHMIDT	
14		F	(1902) Alfred TARSKI	
15		S	(1704) Johann CASTILLON (1717) Matthew STEWART (1850) Sofia Vasilievna KOVALEVSKAJA	
16		S	(1801) Thomas KLAUSEN	
3		17	M	(1847) Nikolay Egorovich ZUKOWSKY (1858) Gabriel KOENIGS
		18	T	(1856) Luigi BIANCHI (1880) Paul EHRENFEST
	19	W	(1813) Rudolf Friedrich Alfred CLEBSCH (1879) Guido FUBINI (1908) Aleksandr Genadiievich KUROV	
	20	T	(1775) Andre-Marie AMPERE (1895) Gabor SZEGO (1904) Renato CACCIOPOLI	
	21	F	(1846) Pieter Hendrik SCHOOTE (1915) Yuri Vladimirovich LINNIK	
	22	S	(1592) Pierre GASSENDI (1908) Lev Davidovich LANDAU	
	23	S	(1840) Ernst ABBE (1862) David HILBERT	
4	24	M	(1891) Abram Samoilovich BESICOVITCH (1914) Vladimir Petrovich POTAPOV	
	25	T	(1627) Robert BOYLE (1736) Joseph-Louis LAGRANGE (1843) Karl Herman Amandus SCHWARTZ	
	26	W	(1799) Benoit Paul Emile CLAPEYRON	
	27	T	(1832) Charles Lutwidge DODGSON	
	28	F	(1701) Charles Marie de LA CONDAMINE (1892) Carlo Emilio BONFERRONI	
	29	S	(1817) William FERREL (1888) Sidney CHAPMAN	
	30	S	(1619) Michelangelo RICCI	
	5	31	M	(1715) Giovanni Francesco FAGNANO dei Toschi (1841) Samuel LOYD (1896) Sofia Alexandrovna JANOWSKAJA

## Putnam 1999 - A1

Find polynomials  $f(x)$ ,  $g(x)$ , and  $h(x)$ , if they exist, such that for all  $x$

$$|f(x)| - |g(x)| + h(x) = \begin{cases} -1 & \text{if } x < -1 \\ 3x + 2 & \text{if } -1 \leq x \leq 0 \\ -2x + 2 & \text{if } x > 0 \end{cases}$$

## Publish or Perish

"Gustatory responses of pigs to various natural and artificial compounds known to be sweet in man," D. Glaser, M. Wanner, J.M. Tinti, and C. Nofre, *Food Chemistry*, vol. 68, no. 4, January 10, 2000, pp. 375-85.

## Murphy's Laws of Math

When you solve a problem, it always helps to know the answer.

The latest authors, like the most ancient, strove to subordinate the phenomena of nature to the laws of mathematics.

Isaac NEWTON

I know not what I appear to the world, but to myself I seem to have been only like a boy playing on the sea-shore, and diverting myself in now and then finding a smoother pebble or a prettier shell, whilst the great ocean of truth lay all undiscovered before me"

Isaac NEWTON

A mathematician's reputation rests on the number of bad proofs he has given

Abram BESICOVITCH

The proof of the Hilbert Basis Theorem is not mathematics; it is theology.

Camille JORDAN

Mathematics is a game played according to certain simple rules with meaningless marks on paper."

David HILBERT

"It's very good jam," said the Queen.

"Well, I don't want any to-day, at any rate."

"You couldn't have it if you did want it," the Queen said. "The rule is jam tomorrow and jam yesterday but never jam to-day."

"It must come sometimes to "jam to-day,"" Alice objected.

"No it can't," said the Queen. "It's jam every other day; to-day isn't any other day, you know."

"I don't understand you," said Alice. "It's dreadfully confusing."

Charles DOGSON

5	1	T	(1900) John Charles BURKILL	
	2	W	(1522) Lodovico FERRARI	
	3	T	(1893) Gaston Maurice JULIA	
	4	F	(1905) Eric Christopher ZEEMAN	
	5	S	(1757) Jean Marie Constant DUHAMEL	
	6	S	(1612) Antoine ARNAULD (1695) Nicolaus (II) BERNOULLI	
6	7	M	(1877) Godfried Harold HARDY (1883) Eric Temple BELL	
	8	T	(1700) Daniel BERNOULLI (1875) Francis Ysidro EDGEWORTH	
	9	W	(1775) Farkas Wolfgang BOLYAI (1907) Harold Scott MacDonald COXETER	
	10	T	(1747) Aida YASUAKI	
	11	F	(1800) William Henry Fox TALBOT (1839) Josiah Willard GIBBS (1915) Richard Wesley HAMMING	
	12	S	(1914) Hanna CAEMMERER NEUMANN (1853) Georgorio RICCI-CURBASTRO	
	13	S	(1805) Johann Peter Gustav Lejeune DIRICHLET	
	7	14	M	(1468) Johann WERNER (1849) Hermann HANKEL (1896) Edward Artur MILNE
		15	T	(1564) Galileo GALILEI (1861) Alfred North WHITEHEAD (1946) Douglas HOFSTADTER
		16	W	(1822) Francis GALTON (1908) Beniamino SEGRE
		17	T	(1890) Sir Ronald Aymler FISHER (1891) Adolf Abraham Halevi FRAENKEL
		18	F	(1404) Leon Battista ALBERTI
		19	S	(1473) Nicolaus COPERNICUS
20		S	(1844) Ludwig BOLTZMANN	
8		21	M	(1591) Girard DESARGUES (1915) Evgenni Mikhailovitch LIFSHTZ
		22	T	(1903) Frank Plumpton RAMSEY
		23	W	(1583) Jean-Baptiste MORIN (1951) Shigefumi MORI
		24	T	(1871) Felix-BERNSTEIN
	25	F	(1827) Henry WATSON	
	26	S	(1780) Dominique Francois Jean ARAGO	
	27	S	(1881) Luitzen Egbertus Jan BROUWER	
9	28	M	(1735) Alexandre Theophile VANDERMONDE (1860) Herman HOLLERITH	

### Putnam 1999 - A2

Let  $p(x)$  be a polynomial that is nonnegative for all real  $x$ . prove that for some  $k$  there are polynomials  $f_1(x), \dots, f_k(x)$  such that

$$p(x) = \sum_{j=1}^k (f_j(x))^2$$

### Publish or Perish

"Some Greek data on handedness, hand clasping and arm folding," M. Pelecanos, *Human Biology*, vol. 41, no. 2, May 1969, pp. 275-8.

### Murphy's Laws of Math

Any expression can be made equal to any other expression if you juggle it enough

Suppose a contradiction were to be found in the axioms of set theory. Do you seriously believe that a bridge would fall down?

Frank RAMSEY

There is an infinite set  $a$  that is not too big.

John VON NEUMANN

There is a tradition of opposition between adherents of induction and of deduction. In my view it would be just as sensible for the two ends of a worm to quarrel.

Alfred WHITEHEAD

Technical skill is mastery of complexity while creativity is mastery of simplicity.

Eric ZEEMAN

"Common sense is not really so common"

Antoine ARNAUD

"Archimedes will be remembered when Aeschylus is forgotten, because languages die and mathematical ideas do not. "Immortality" may be a silly word, but probably a mathematician has the best chance of whatever it may mean."

Godfried HARDY

"it would be better for the true physics if there were no mathematicians on earth"

Daniel BERNOULLI

"Euler calculated without effort, just as men breathe, as eagles sustain themselves in the air"

Dominique ARAGO



9	1	T	(1611) John PELL	
	2	W	(1836) Julius WEINGARTEN	
	3	T	(1838) George William HILL (1845) Georg CANTOR	
	4	F	(1822) Jules Antoine LISSAJUS	
	5	S	(1512) Gerardus MERCATOR (1759) Benjamin GOMPERTZ (1817) Angelo GENOCCHI	
	6	S	(1866) Ettore BORTOLOTTI	
10	7	M	(1792) William HERSCHEL (1824) Delfino CODAZZI	
	8	T	(1851) George CHRYSTAL	
	9	W	(1818) Ferdinand JOACHIMSTHAL (1900) Howard Hathaway AIKEN	
	10	T	(1864) William Fogg OSGOOD	
	11	F	(1811) Urbain Jean Joseph LE VERRIER (1853) Salyatore PINCHERLE	
	12	S	(1685) George BERKELEY (1824) Gustav Robert KIRKHOFF (1859) Ernesto CESARO	
	13	S	(1661) Jules Joseph DRACH (1957) Rudy D'ALEMBERT	
	11	14	M	(1864) Jozef KURSCHAK (1879) Albert EINSTEIN
		15	T	(1860) Walter Frank Raphael WELDON (1868) Grace CHISOLM YOUNG
		16	W	(1750) Caroline HERSCHEL (1789) Georg Simon OHM (1846) Magnus Gosta MHTTAGLEFFLER
17		T	(1876) Ernest Benjamin ESCLANGON (1897) Charles FOX	
18		F	(1640) Philippe de LA HIRE (1690) Christian GOLDBACH (1796) Jacob STEINER	
19		S	(1862) Adolf KNESER (1910) Jacob WOLFOWITZ	
20		S	(1840) Franz MERTENS (1884) Philip FRANK (1938) Sergei Petrovich NOVIKOV	
12		21	M	(1768) Jean Baptiste Joseph FOURIER (1884) George David BIRKHOFF
		22	T	(1917) Irving KAPLANSKY
		23	W	(1754) Georg Freiherr von VEGA (1882) Emmy Amalie NOETHER (1897) John Lighton SYNGE
	24	T	(1809) Joseph LIOUVILLE (1948) Sun-Yung (Alice) CHANG	
	25	F	(1538) Christopher CLAUDIUS	
	26	S	(1848) Konstantin ADREEV (1913) Paul ERDOS	
	27	S	(1857) Karl PEARSON	
	13	28	M	(1749) Pierre Simon de LAPLACE
29		T	(1825) Francesco FAA' DI BRUNO (1873) Tullio LEVI-CIVITA (1896) Wilhelm ACKERMAN	
30		W	(1892) Stefan BANACH	
31		T	(1596) Rene' DESCARTES	

### Putnam 1999 - A3

Consider the power series expansion

$$\frac{1}{1 - 2x - x^2} = \sum_{n=0}^{\infty} a_n x^n$$

Prove that, for each integer  $n \geq 0$ , there is an integer  $m$  such that

$$a_n^2 + a_{n+1}^2 = a_m$$

### Publish or Perish

"Ice cream headache. Ice cream headache occurred during surfing in winter," M. Harris, *British Medical Journal*, vol. 315, no. 7108, 1997, p. 609.

### Murphy's Laws of Math

Proofs don't convince anybody of anything

Geometry is the noblest branch of physics.

William OSGOOD

Modern science, as framing the mind to an exact and impartial analysis of facts, is an education specially fitted to promote citizenship

Karl PEARSON

"The northern ocean is beautiful", said the Orc, "and beautiful the delicate intricacy of the snowflake before it melts and perishes, but such beauties are as nothing to him who delights in numbers, spurning alike the wild irrationality of life and the baffling complexities of nature's laws."

John SYNGE

"Common sense is nothing more than a deposit of prejudices laid down in the mind before you reach eighteen."

Albert EINSTEIN

"We [he and Halmos] share a philosophy about linear algebra: we think basis-free, we write basis-free, but when the chips are down we close the office door and compute with matrices like fury."

Irving KAPLANSKY

"A Mathematician is a machine for turning coffee into theorems."

Paul ERDOS

"What we know is not much. What we do not know is immense."

Pierre Simon de LAPLACE

13	1	F	(1640) Georg MOHR (1776) Marie-Sophie GERMAIN (1895) Alexander Craig AITKEN	
	2	S	(1934) Paul Joseph COHEN	
	3	S	(1835) John Howard Van AMRINGE (1892) Hans RADEMACHER (1900) Albert Edward INGHAM (1909) Stanislaw Marcin ULAM (1971) Alice RIDDLE	
14	4	M	(1809) Benjamin PEIRCE (1842) Francois Edouard Anatole LUCAS (1949) Shing-Tung YAU	
	5	T	(1588) Thomas HOBBS (1607) Honore FABRI (1622) Vincenzo VIVIANI (1869) Sergi Alexeievich CHAPLYGIN	
	6	W	(1890) André Louis DANJON	
	7	T	(1768) Francois Joseph FRANCAIS	
	8	F	(1903) Marshall Harvey STONE	
	9	S	(1791) George PEACOCK (1816) Charles Eugene DELAUNAY (1919) John Presper HECKERT	
	10	S	(1857) Henry Ernest DUDENEY	
	15	11	M	(1953) Andrew John WILES
		12	T	(1794) Germinal Pierre DANDELIN (1852) Carl Louis Ferdinand Von LINDEMANN (1908) Jan TINBERGEN
		13	W	(1728) Paolo FRISI (1818) Duncan Farquharson GREGORY (1879) Francesco SEVERI
14		T	(1629) Christiaan HUYGENS	
15		F	(1452) Leonardo da VINCI (1548) Pietro Antonio CATALDI (1707) Leonhard EULER (1809) Herman Gunther GRASSMANN	
16		S	(1682) John HADLEY (1823) Ferdinand Gotthold Max EISENSTEIN	
17		S	(1798) Etienne BOBILLIER (1853) Arthur Moritz SCHONFLIES	
16		18	M	(1907) Lars Valerian AHLFORS (1918) Hsien Chung WANG (1949) Charles LUIS FEFERMAN
		19	T	(1880) Evgeny Evgenievich SLUTSKY (1883) Richard VON MISES (1901) Kiyoshi OKA (1905) Charles EHRESMANN
		20	W	(1839) Francesco SIACCI
	21	T	(1652) Michel ROLLE (1774) Jean Baptiste BIOT (1875) Teiji TAKAGI	
	22	F	(1811) Otto Ludwig HESSE (1887) Harald August BOHR	
	23	S	(1858) Max Karl Ernst Ludwig PLANCK	
	24	S	(1863) Giovanni VAILATI	
	17	25	M	(1849) Felix Christian KLEIN (1900) Wolfgang PAULI (1903) Andrei Nicolayevich KOLMOGOROV
		26	T	(1889) Ludwig Josef Johan WITTENGSTEIN
		27	W	(1755) Marc-Antoine PARSEVAL des Chenes
28		T	(1906) Kurt GODEL	
29		F	(1854) Jules Henri POINCARÉ	
30		S	(1777) Johann Carl Friedrich GAUSS (1916) Claude Elwood SHANNON	

## Putnam 1999 - A4

Sum the series

$$\sum_{m=1}^{\infty} \sum_{n=1}^{\infty} \frac{m^2 n}{3^m (n3^m + m3^n)}$$

## Publish or Perish

"How does a fungus know the time of day?" L. Geetha and R. Gadagkar, *Current Science*, vol. 70, 1996, pp. 419-21.

## Murphy's Laws of Math

Notes you understood perfectly in class transform themselves into hieroglyphics at home.

This paper is so bad it is not even wrong.

Wolfgang PAULI

Mathematics is the science which draws necessary conclusions.

Benjamin PEIRCE

If anybody says he can think about quantum problems without getting giddy, that only shows he has not understood the first thing about them.

Max PLANCK

Mathematicians are born, not made.

Henri POINCARÉ

For Bourbaki, Poincaré was the devil incarnate. For students of chaos and fractals, Poincaré is of course God on Hearth.

Marshall STONE

Any good idea can be stated in fifty words or less.

Stanislaw ULAM

"You treat world history as a mathematician does mathematics, in which nothing but laws and formulae exist, no reality, no good and evil, no time, no yesterday, no tomorrow, nothing but an eternal shallow, mathematical present."

Otto Ludwig HESSE

"An important scientific innovation rarely makes its way by gradually winning over and converting its opponents: it rarely happens that Saul becomes Paul. What does happen is that its opponents gradually die out, and that the growing generation is familiarised with the ideas from the beginning"

Max Karl Ernst Ludwig PLANCK

"Everyone knows what a curve is, until he has studied enough mathematics to become confused through the countless number of possible exceptions."

Felix KLEIN

"The fact that the author thinks slowly is not serious, but the fact that he publishes faster than he thinks is inexcusable."

Wolfgang PAULI



17	1	S	(1825) Johann Jacob BALMER	
18	2	M	(1860) D'Arcy Wentworth THOMPSON (1905) Kazimierz ZARANKIEWITZ	
	3	T	(1842) Otto STOLZ (1860) Vito VOLTERRA	
	4	W	(1845) William Kingdon CLIFFORD	
	5	T	(1833) Lazarus Emmanuel FUCHS (1897) Francesco Giacomo TRICOMI	
	6	F	(1872) Willem DE SITTER (1906) Andre' WEIL	
	7	S	(1713) Alexis Claude CLAIRAUT (1854) Giuseppe VERONESE (1881) Ebenezer CUNNINGHAM (1896) Pavel Sergieievich ALEXANDROV	
	8	S	(1859) Johan Ludvig Wilham Valdemar JENSEN	
	19	9	M	(1746) Gaspard MONGE (1876) Gilbert Ames BLISS
10		T	(1788) Augustin Jean FRESNEL (1847) William Karl Joseph KILLING (1958) Piotr Rizerovich SILVERBRAHMS	
11		W	(1918) Richard Phillips FEYNMAN	
12		T	(1845) Pierre Rene' Jean Baptiste Henry BROCARD (1902) Frank YATES	
13		F	(1750) Lorenzo MASCHERONI	
14		S	(1832) Rudolf Otto Sigismund LIPSCHITZ (1863) John Charles FIELDS	
15		S	(1939) Brian HARTLEY	
20		16	M	(1718) Maria Gaetana AGNESI (1821) Pafnuti Lvovi CHEBYSHEV
		17	T	(1836) Sir Joseph Norman LOCKYER (1867) Gerrit MANNOURY
		18	W	(1850) Oliver HEAVISIDE (1872) Bertrand Arthur William RUSSELL (1048) Ghiyath al-Din Abu'l-Fath [...] (Omar) al-KHAYYAM(0)
		19	T	(1919) Georgii Dimitriievich SUVOROV
		20	F	(1861) Henry Seely WHITE
		21	S	(1471) Albrecht DURER (1792) Gustave Gaspard de CORIOLIS
		22	S	(1865) Alfred Cardew DIXON
		21	23	M
	24		T	(1903) Wladyslaw ORLICZ
	25		W	(1838) Karl Mikailovich PETERSON
26	T		(1667) Abraham DE-MOIVRE (1896) Yuri Dimitriievich SOKOLOV	
27	F		(1862) John Edward CAMPBELL	
28	S		(1676) Jacopo Francesco RICCATI (1710) Johann (II) BERNOULLI	
29	S		(1882) Harry BATEMAN	
22	30		M	(1814) Eugene Charles CATALAN
	31		T	(1926) John KEMENY

### Putnam 1999 - A5

Prove that there is a constant  $C$  such that, if  $p(x)$  is a polynomial of degree 1999, then

$$|p(0)| = \int_{-1}^1 |p(x)| dx$$

### Publish or Perish

"*Egocentric Thought in Petitionary Prayer: a Cross-Cultural Study*," L.B. Brown, *Journal of Social Psychology*, vol. 68, no. 2, April 1966, pp. 197-210.

### Murphy's Laws of Math

Textbooks are written for those who already know the subject.

Although this may seem a paradox, all exact science is dominated by the idea of approximation.

Bertrand RUSSELL

"Nature is not embarrassed by difficulties of analysis."

Augustin Jean FRESNEL

"Now one may ask, 'What is mathematics doing in a physics lecture?' We have several possible excuses: first, of course, mathematics is an important tool, but that would only excuse us for giving the formula in two minutes. On the other hand, in theoretical physics we discover that all our laws can be written in mathematical form; and that this has a certain simplicity and beauty about it. But the real reason is that the subject is enjoyable and although we humans cut nature up in different ways, and we have different courses in different departments, such compartmentalization is really artificial, and we should take our intellectual pleasures where we find them."

Richard Phillips FEYNMAN

"To isolate mathematics from the practical demands of the sciences is to invite the sterility of a cow shut away from the bulls."

Pafnuti CHEBYSHEV

"Mathematics is very much like poetry. What makes a great poem is that there is a great amount of thought expressed in very few words. In this sense, formulas like  $e^{\pi}+1=0$  are poems.

Lipa BERS

22	1	W	(1796) Sadi Leonard Nicolas CARNOT (1851) Edward Bailey ELLIOTT (1899) Edward Charles TITCHMARSH	
	2	T	(1895) Tibor RADO	
	3	F	(1659) David GREGORY	
	4	S	(1809) John Henry PRATT	
	5	S	(1814) Pierre LAurent WANTZEL (1819) John Couch ADAMS	
23	6	M	(1436) Johann Muller REGIOMONTANUS (1857) Aleksandr Michailovitch LYAPUNOV (1906) Max ZORN	
	7	T	(1863) Edward Burr VAN VLECK	
	8	W	(1625) Giovanni Domenico CASSINI (1858) Charlotte Angas SCOTT (1860) Alicia Boole STOTT	
	9	T	(1885) John Edensor LITTLEWOOD	
	10	F	(940) Mohammad ABU'L Wafa Al-Buzjani (1887) Vladimir Ivanovich SMIRNOV	
	11	S	(1937) David Bryant MUMFORD	
	12	S	(1888) Zygmunt JANYSZEWSKI	
	24	13	M	(1831) James Clerk MAXWELL (1876) William Sealey GOSSET (Student) (1928) John Forbes NASH
14		T	(1736) Charles Augustin de COULOMB (1856) Andrei Andreyevich MARKOV (1903) Alonzo CHURCH	
15		W	(1640) Bernard LAMY (1894) Nikolai Gregorievich CHEBOTARYOV	
16		T	(1915) John Wilder TUKEY	
17		F	(1898) Maurits Cornelius ESCHER	
18		S	(1858) Andrew Russell FORSYTH (1884) Charles Ernest WEATHERBURN	
19		S	(1623) Blaise PASCAL (1902) Wallace John ECKERT	
25		20	M	(1873) Alfred LOEWY
		21	T	(1781) Simeon Denis POISSON (1828) Giuseppe BRUNO
		22	W	(1860) Mario PIERI (1864) Hermann MINKOWSKY (1910) Konrad ZUSE
	23	T	(1912) Alan Mathison TURING	
	24	F	(1880) Oswald VEBLEN	
	25	S	(1908) Willard Van Orman QUINE	
	26	S	(1824) William THOMPSON, Lord Kelvin (1918) Yudel-Leo LUKE	
	26	27	M	(1806) Augustus DE MORGAN
28		T	(1875) Henri Leon LEBESGUE	
29		W	(1888) Aleksandr Aleksandrovich FRIEDMANN	
30		T	(1791) Felix SAVART	

### Putnam 1999 - A6

The sequence  $(a_n)_{n \geq 1}$  is defined by:

$$a_1 = 1, a_2 = 2, a_3 = 24,$$

$$a_{n \geq 4} = \frac{6a_{n-1}^2 a_{n-3} - 8a_{n-1} a_{n-2}^2}{a_{n-2} a_{n-3}}$$

Show that, for all  $n$ ,  $a_n$  is an integer multiple of  $n$ .

### Publish or Perish

"Real and Imaginary Halitosis," C. Hawkins, *British Medical Journal (Clinical Research Edition)*, vol. 294, no. 6566, January 24, 1987, pp. 200-1.

### Murphy's Laws of Math

Any simple idea can be expressed in incomprehensible terms.

It is not certain that everything is uncertain.

Blaise PASCAL

Life is good for only two things, discovering mathematics and teaching mathematics.

Simenon POISSON

[Irrational numbers] is a convenient myth which simplify the laws of arithmetic.

Willard Van Orman QUINE

I met a man once who told me that far from believing in the square root of minus one, he didn't believe in minus one. This is at any rate a consistent attitude.

Edward TITCHMARSH

"It can be of no practical use to know that  $\pi$  is irrational, but if we can know, it surely would be intolerable not to know".

Edward Charles TITCHMARSH

"What I give form to in daylight is only one per cent of what I have seen in darkness"

Maurits Cornelius ESCHER

"The more I see of men, the better I like my dog"

Blaise PASCAL

"Science is a differential equation. Religion is a boundary condition"

Alan Mathison TURING

"In my opinion, a mathematician, in so far as he is a mathematician, need not preoccupy himself with philosophy -- an opinion, moreover, which has been expressed by many philosophers."

Henri LEBESGUE

We can only see a short distance ahead, but we can see plenty there that needs to be done.

Alan TURING



26	1	F	(1643) Gottfried Wilhelm von LEIBNITZ (1788) Jean Victor PONCELET	
	2	S	(1820) William John Macquorn RANKINE (1852) William BURNSIDE	
	3	S	(1807) Ernest Jean Philippe Fauque de JONQUIERE (1897) Jesse DOUGLAS	
27	4	M	(1906) Daniel Edwin RUTHERFORD (1917) Michail Samuilovich LIVSIC	
	5	T	(1820) William John Macquorn RANKINE (1867) Andrew Ellicott DOUGLASS	
	6	W	(1849) Alfred Bray KEMPE	
	7	T	(1816) Johann Rudolf WOLF (1906) William FELLER (1922) Vladimir Aleksandrovich MARCHENKO	
	8	F	(1760) Christian KRAMP	
	9	S	(1845) George Howard DARWIN	
	10	S	(1862) Roger COÛTES (1868) Oliver Dimon KELLOGG	
	28	11	M	(1857) Sir Joseph LARMOR (1890) Giacomo ALBANESE
		12	T	(1875) Ernest Sigismund FISCHER (1895) Richard BUCKMINSTER FULLER
		13	W	(1527) John DEE (1741) Karl Friedrich HINDENBURG
14		T	(1793) George GREEN	
15		F	(1865) Wilhelm WIRTINGER (1906) Adolph Andrej Pavlovich YUSHKEVICH	
16		S	(1678) Jakob HERMANN (1908) Irmgard FLÜGGE-LOTZ	
17		S	(1831) Victor Mayer Amedee MANNHEIM (1837) Wilhelm LEXIS	
29		18	M	(1013) Hermann von REICHENAU (1635) Robert HOOKE (1853) Hendrich Antoon LORENTZ
	19	T	(1768) Francois Joseph SERVOIS	
	20	W	(1947) Gerd BINNIG (1924) Robert MAURER	
	21	T	(1620) Jean PIGARD (1848) Emil WEYR (1849) Robert Simpson WOODWARD	
	22	F	(1784) Friedrich Wilhelm BESSEL	
	23	S	(1775) Etienne Louis MALUS (1854) Ivan SLEZYNSKY	
	24	S	(1851) Friedrich Herman SCHOTTKY (1871) Paul EPSTEIN (1923) Christine Mary HAMILL	
	30	25	M	(1808) Johann Benedict LISTING
26		T	(1903) Kurt MAHLER	
27		W	(1667) Johann BERNOULLI (1801) George Biddel AIRY (1848) Lorand Baron von EOTVOS (1871) Ernst Friedrich Ferdinand ZERMELO	
28		T	(1954) Gerd FALTINGS	
29		F	(1898) Isidor Isaac RABI	
30		S		
31		S	(1704) Gabriel CRAMER (1712) Johann Samuel KOENIG	

## Putnam 1999 - B1

Right triangle  $ABC$  has right angle in  $C$  and  $\hat{A}BC = \vartheta$ . The point  $D$  is chosen on  $AB$  so that  $|AC| = |AD| = 1$ ; the point  $E$  is chosen on  $BC$  so that  $\hat{CDE} = \vartheta$ . The perpendicular to  $BC$  at  $E$  meets  $AB$  at  $F$ . Evaluate  $\lim_{\vartheta \rightarrow 0} |EF|$

## Publish or Perish

"Chronic Consumption of Raw But Not Boiled Welsh Onion Juice Inhibits Rat Platelet Function," J.H. Chen, H.I. Chen, S.J. Tsai, and C.J. Jen, *Journal of Nutrition*, vol. 130, no. 1, January 2000, pp. 34-7.

## Murphy's Laws of Math

The answers you need aren't in the back of the book.

[The infinitesimals] neither have nor can have theory; in practise it is a dangerous instrument in the hands of beginners... anticipating, for my part, the judgement of posterity, I would predict that this method will be accused one day, and rightly, of having retarded the progress of the mathematical sciences.

Francois SERVOIS

"When working on a problem, I never think about beauty; I think only of how to solve the problem. But when I have finished, if the solution is not beautiful, I know that it is wrong."

Richard Buckminster FULLER

"CEIHOSSOTTUU"

Anagram to establish priority in the discovery of elasticity: "Ut tensio, sic vis"

Robert HOOKE

"A quantity which is increased or decreased by an infinitely small quantity is neither increased nor decreased."

Johann BERNOULLI



31	1	M	(1861) Ivar Otto BENDIXSON (1881) Otto TOEPLITZ
	2	T	(1856) Ferdinand RUDIO (1902) Mina Spiegel REES
	3	W	(1914) Mark KAC
	4	T	(1805) Sir William Rowan HAMILTON (1838) John VENN
	5	F	(1802) Niels Henrik ABEL
	6	S	(1638) Nicolas MALEBRANCHE (1741) John WILSON
	7	S	(1868) Ladislaus Josephowitsch BORTKIEWITZ
32	8	M	(1902) Paul Adrien Maurice DIRAC
	9	T	(1537) Francesco BAROZZI (Franciscus Barocius)
	10	W	(1602) Gilles Personne de ROBERVAL
	11	T	(1730) Charles BOSSUT (1842) Enrico D'OIDIO
	12	F	(1882) Jules Antoine RICHARD (1887) Erwin Rudolf Josef Alexander SCHRODINGER
	13	S	(1625) Erasmus BARTHOLIN (1819) George Gabriel STOKES (1861) Cesare BURALI-FORTI
	14	S	(1530) Giovanni Battista BENEDETTI (1842) Jean Gaston DARBOUX (1865) Guido CASTELNUOVO (1866) Charles Gustave Nicolas de la VALLEE POUSSIN
33	15	M	(1868) Aleksei Nikolaevich KRYLOV (1892) Louis Pierre Victor duc de BROGLIE (1901) Petr Sergeevich NOVIKOV
	16	T	(1772) Louis Beniamin FRANCOEUR (1821) Arthur CAYLEY
	17	W	(1601) Pierre de FERMAT
	18	T	(1685) Brook TAYLOR
	19	F	(1646) John FLAMSTEED (1739) Georg Simon KLUGEL
	20	S	(1710) Thomas SIMPSON (1863) Conrado SEGRE (1882) Wacław ŚIERPINSKI
	21	S	(1789) Augustin Louis CAUCHY
34	22	M	(1647) Denis PAPIN
	23	T	(1682) Giovanni POLENI (1829) Moritz Benedikt CANTOR
	24	W	(1567) Bartholomaeus PITISCUS (1942) Karen Keskulla UHLENBECK
	25	T	(1561) Philip van LANSBERGE (1844) Thomas MUIR
	26	F	(1728) Johann Heinrich LAMBERT (1875) Giuseppe VITALI
	27	S	(1858) Giuseppe PEANO
	28	S	(1796) Ireneé Jules BIENAYME
35	29	M	(1904) Leonard ROTH
	30	T	(1856) Carl David Tolme RUNGE (1906) Olga TAUSKY-TODD
	31	W	(1821) Hermann Ludwig Ferdinand von HELMHOLTZ

### Putnam 1999 - B2

Let  $P(x)$  be a polynomial of degree  $n$  such that  $P(x) = Q(x)P''(x)$ , where  $Q(x)$  is a quadratic polynomial and  $P''(x)$  is the second derivative of  $P(x)$ .

Show that if  $P(x)$  has at least two distinct roots then it must have  $n$  distinct roots.

### Publish or Perish

"Ultrasonic Velocity in Cheddar Cheese as Affected by Temperature," A. Mulet, J. Benedito, J. Bon, and C. Rossello, *Journal of Food Science*, vol. 64, no. 6, 1999, pp. 1038-41.

### Murphy's Laws of Math

No matter how much you study for exams, it will never be enough

"The whole form of mathematical thinking was created by Euler. It is only with the greatest of difficulty that one is able to follow the writings of any author preceding Euler, because it was not yet known how to let the formulas speak for themselves. This art Euler was the first to teach."

Ferdinand RUDIO

"There are surely worse things than being wrong, and being dull and pedantic are surely among them."

Mark KAC

"This result is too beautiful to be false; it is more important to have beauty in one's equations than to have them fit experiment."

Paul Adrien Maurice DIRAC

"And perhaps, posterity will thank me for having shown it that the ancients did not know everything."

Pierre de FERMAT

"Cubum autem in duos cubos, aut quadratoquadratum in duos quadratoquadratos, et generaliter nullam in infinitum ultra quadratum potestatem in duos ejusdem nominis fas est dividere: cujus rei demonstrationem mirabilem sane detexi. Hanc marginis exiguitas non caperet"

Pierre de FERMAT

"Newton is, of course, the greatest of all Cambridge professors; he also happens to be the greatest disaster that ever befell not merely Cambridge mathematics in particular, but British mathematical science as a whole"

Leonard ROTH

35	1	T	(1659) Joseph SAURIN (1835) William Stankey JEVONS	
	2	F	(1878) Maurice Rene' FRECHET (1923) Rene' THOM	
	3	S	(1814) James Joseph SYLVESTER (1884) Solomon LEFSCHETZ (1908) Lev Semenovich PONTRYAGIN	
	4	S	(1809) Luigi Federico MENABREA	
36	5	M	(1667) Giovanni Girolamo SACCHERI (1725) Jean Etienne MONTUCLA	
	6	T	(1859) Boris Jakovlevich BUKREEV (1863) Dimitri Aleksandrovich GRAVE	
	7	W	(1707) George Louis Leclerc comte de BUFFON (1955) Efim ZELMANOV	
	8	T	(1584) Gregorius SAINT-VINCENT (1588) Marin MERSENNE	
	9	F	(1860) Frank MORLEY	
	10	S	(1839) Charles Sanders PEIRCE	
	11	S	(1623) Stefano degli ANGELI (1877) sir James Hopwood JEANS	
	37	12	M	(1891) Antoine Andre' Louis REYNAUD (1900) Haskell Brooks CURRY
		13	T	(1873) Constantin CARATHEODORY (1885) Wilhelm Johann Eugen BLASCHKE
14		W	(1858) Henry Burchard FINE (1891) Ivan Matveevich VINOGRADOV	
15		T	(973) Abu Arrayhan Muhammad ibn Ahmad AL BIRUNI (1886) Paul Pierre LEVY	
16		F	(1494) Francisco MAUROLICO (1736) Johann Nikolaus TETENS	
17		S	(1743) Marie Jean Antoine Nicolas de Caritat de CONDORCET (1826) Georg Friedrich Bernhard RIEMANN	
18		S	(1752) Adrien Marie LEGENDRE	
38	19	M	(1749) Jean Baptiste DELAMBRE	
	20	T	(1842) Alexander Wilhelm von BRILL (1861) Frank Nelson COLE	
	21	W	(1899) Juliusz Pawel SCHAUDER	
	22	T	(1765) Paolo RUFFINI (1769) Louis PUISSANT (1803) Jaques Charles Francois STURM	
	23	F	(1768) William WALLACE (1900) David van DANTZIG	
	24	S	(1501) Girolamo CARDANO (1625) Johan DE WITT (1801) Michail Vasilievich OSTROGRADSKI	
	25	S	(1819) George SALMON (1888) Stefan MAZURKIEWICZ	
	39	26	M	(1688) Willem Jakob 's GRAVESANDE (1854) Percy Alexander MACMAHON (1891) Hans REICHENBACH
27		T	(1855) Paul Emile APPEL (1876) Earle Raymond HEDRICK (1919) James Hardy WILKINSON	
28		W	(1698) Pierre Louis Moreau de MAUPERTUIS (1761) Ferdinand Francois Desire' Budan de BOISLAURENT (1873) Julian Lowell COOLIDGE	
29		T	(1561) Adriaan van ROOMEN (1812) Adolph GOPEL	
30		F	(1775) Robert ADRAIN (1829) Joseph WOLSTENHOLME (1883) Ernst HELLINGER	

**Putnam 1999 - B3**

Let  $A = \{(x, y) : 0 \leq x, y < 1\}$ . For  $(x, y) \in A$ , let

$$S(x, y) = \sum_{\frac{1}{2} \leq \frac{m}{n} \leq 2} x^m y^n$$

where the sum ranges over all pairs  $(m, n)$  of positive integers satisfying the indicated inequalities. Evaluate

$$\lim_{(x,y) \rightarrow (1,1), (x,y) \in A} (1 - xy^2)(1 - x^2y)S(x, y).$$

**Publish or Perish**

"Counterfactual Thinking and Satisfaction Among Olympic Medalists," V.H. Medvec, S.F. Madey, T. Gilovich. *Journal of Personality and Social Psychology*, vol. 69, no. 4, October 1995, pp. 603-10.

**Murphy's Laws of Math**

The problems you can work are never put on the exam

The pragmatist knows that doubt is an art which has to be acquired with difficulty.

Charles Sanders PEIRCE

If only I had the theorem! Then I should find the proofs easily enough.

Bernhard RIEMANN

I believe that proving is not a natural activity for mathematicians.

Rene' THOM

"The importance of the 'New Mathematics' lies mainly in the fact that it has taught us the difference between the disc and the circle."

Rene' THOM

"If it's just turning the crank it's algebra, but if it's got an idea in it, it's topology."

Solomon LEFSCHETZ

"This branch of mathematics [Probability] is the only one, I believe, in which good writers frequently get results which are entirely erroneous."

Charles Sanders PEIRCE

"We may as well cut out the group theory. That is a subject that will never be of any use in physics."

sir James Hopwood JEANS

"If error is corrected whenever it is recognised, the path of error is the path of truth."

Hans REICHENBACH



39	1	S	(1671) Luigi Guido GRANDI (1898) Bela KEREKJARTO	
	2	S	(1825) John James WALKER (1908) Arthur ERDELYI	
40	3	M	(1944) Pierre Rene' DELIGNE	
	4	T	(1759) Louis Francois Antoine ARBOGAST (1797) Jerome SAVARY	
	5	W	(1732) Nevil MASKELYNE (1781) Bernhard Placidus Johann Nepomuk BOLZANO (1861) Thomas Little HEATH	
	6	T	(1552) Matteo RICCI (1831) Julius Wilhelm Richard DEDEKIND (1908) Sergei Lvovich SOBOLEV	
	7	F	(1885) Niels BOHR	
	8	S	(1908) Hans Arnold HEILBRONN	
	9	S	(1581) Claude Gaspard BACHET de Meziriac (1704) Johann Andrea von SEGNER (1873) Karl SCHWARTZSCHILD	
41	10	M	(1861) Heinrich Friedrich Karl Ludwig BURKHARDT	
	11	T	(1675) Samuel CLARKE (1777) Barnabe' BRISSON (1885) Alfred HAAR (1910) Cahit ARF	
	12	W	(1860) Elmer SPERRY	
	13	T	(1890) Georg FEIGL (1898) Kurt Werner Friedrich REIDEMEISTER (1932) John Griggs THOMPSON	
	14	F	(1687) Robert SIMSON (1801) Joseph Antoine Ferdinand PLATEAU (1865) Alessandro PADOA	
	15	S	(1608) Evangelista TORRICELLI (1735) Jesse RAMSDEN (1776) Peter BARLOW	
	16	S	(1879) Philip Edward Bertrand JOURDAIN	
	42	17	M	(1759) Jacob (II) BERNOULLI (1888) Paul Isaac BERNAYS
		18	T	(1945) Margaret McDUFF
19		W	(1903) Jean Frederic Auguste DELSARTE (1910) Subrahmanyan CHANDRASEKHAR	
20		T	(1632) Sir Christopher WREN (1863) William Henry YOUNG (1865) Aleksandr Petrovich KOTELNIKOV	
21		F	(1677) Nicolas (I) BERNOULLI (1823) Enrico BETTI (1853) Giovan Battista GUCCIA (1893) William Leonard FERRAR	
22		S	(1587) Joachim JUNGIUS (1895) Rolf Herman NEVANLINNA (1907) Sarvadaman CHOWLA	
23		S	(1865) Piers BOHL	
43		24	M	(1804) Wilhelm Eduard WEBER (1873) Edmund Taylor WITTAKER
	25	T	(1811) Evariste GALOIS	
	26	W	(1849) Ferdinand Georg FROBENIUS (1857) Charles Max MASON (1911) Shiing-Shen CHERN	
	27	T	(1678) Pierre Remond de MONTMORT (1856) Ernest William HOBSON	
	28	F	(1804) Pierre Francois VERHULST	
	29	S	(1925) Klaus ROTH	
	30	S	(1906) Andrej Nikolaevich TIKHONOV	
	44	31	M	(1815) Karl Theodor Wilhelm WEIERSTRASS

## Putnam 1999 - B4

Let  $f(x)$  be a real function with continuous third derivative such that  $f'(x)$ ,  $f''(x)$ ,  $f'''(x)$  are positive for all  $x$ . Suppose that

$$f'''(x) \leq f(x).$$

Show that

$$f'(x) \leq 2f(x)$$

for all  $x$ .

## Publish or Perish

"Unskilled and Unaware of It: How Difficulties in Recognizing One's Own Incompetence Lead to Inflated Self-Assessments." D. Dunning, J Kreuger, *Journal of Personality and Social Psychology*, vol. 77, no. 6, December 1999, pp. 1121-34.

## Murphy's Laws of Math

The problems you are certain won't be on the test will be

"An expert is a man who has made all the mistakes which can be made in a very narrow field"

Niels BOHR

" $2^{30}(2^{31}-1)$  is the greatest perfect number that will ever be discovered, for, as they are merely curious without being useful, it is not likely that any person will attempt to find a number beyond it"

Peter BARLOW

"The Council of the Royal Society is a collection of men who elect each other to office and then dine together at the expense of this society to praise each other over wine and give each other medals."

Charles BABBAGE

"Unfortunately what is little recognized is that the most worthwhile scientific books are those in which the author clearly indicates what he does not know; for an author most hurts his readers by concealing difficulties."

Evariste GALOIS

"It is true that a mathematician who is not also something of a poet will never be a perfect mathematician."

Karl Theodor Wilhelm WEIERSTRASS



44	1	T	(1535) Giambattista DELLA PORTA	
	2	W	(1815) George BOOLE	
	3	T	(1867) Martin Wilhelm KUTTA (1878) Arthur Byron COBLE	
	4	F	(1744) Johann (III) BERNOULLI (1865) Pierre Simon GIRARD	
	5	S	(1848) James Whitbread Lee GLAISHER (1930) John Frank ADAMS	
	6	S	(1781) Giovanni Antonio Amedeo PLANA	
45	7	M	(1660) Thomas Fantet DE LAGNY (1799) Karl Heinrich GRAFFE (1898) Raphael SALEM	
	8	T	(1656) Edmond HALLEY (1846) Eugenio BERTINI (1848) Fredrich Ludwig Gottlob FREGE (1854) Johannes Robert RYDBERG (1869) Felix HAUSDORFF	
	9	W	(1847) Carlo Alberto CASTIGLIANO (1885) Theodor Franz Eduard KALUZA (1885) Hermann Klaus Hugo WEYL (1906) Jaroslav Borisovich LOPATYNSKY (1922) Imre LAKATOS	
	10	T	(1829) Helwin Bruno CHRISTOPFEL	
	11	F	(1904) John Henry Constantine WHITEHEAD	
	12	S	(1825) Michail Egorovich VASHCHENKO-ZAKHARCHENKO (1842) John William STRUTT Lord RAYLEIGH (1927) Yutaka TANIYAMA	
	13	S	(1876) Ernest Julius WILKZYNSKY (1878) Max Wilhelm DEHN	
	46	14	M	(1845) Ulisse DINI
		15	T	(1688) Louis Bertrand CASTEL (1793) Michel CHASLES (1794) Franz Adolph TAURINUS
		16	W	(1835) Eugenio BELTRAMI
17		T	(1597) Henry GELLIBRAND (1717) Jean Le Rond D'ALEMBERT (1790) August Ferdinand MOBIUS	
18		F	(1872) Giovanni Enrico Eugenio VACCA (1927) Jon Leslie BRITTON	
19		S	(1894) Heinz HOPF (1900) Michail Alekseevich LAVRENTEV (1901) Nina Karlovna BARI	
20		S	(1889) Edwin Powell HUBBLE (1928) Benoit MANDELBROT	
47		21	M	(1867) Dimitri SINTSOV
		22	T	(1803) Giusto BELLAVITIS (1840) Emile Michel Hyacinthe LEMOINE
		23	W	(1616) John WALLIS (1820) Issac TODHUNTER
	24	T	(1549) Duncan MacLaren Young SOMERVILLE (1909) Gerhard GENTZEN	
	25	F	(1873) Claude Louis MATHIEU (1841) Fredrich Wilhelm Karl Ernst SCHRODER	
	26	S	(1894) Norbert WIENER (1946) Enrico BOMBIERI	
	27	S	(1867) Arthur Lee DIXON	
	48	28	M	(1898) John WISHART
29		T	(1803) Christian Andreas DOPPLER (1849) Horace LAMB (1879) Nikolay Mitrofanovich KRYLOV	
30		W	(1549) Sir Henry SAVILE	

**Putnam 1999 - B5**

For an integer  $n \geq 3$ , let  $\vartheta = \frac{2\pi}{n}$ .

Evaluate the determinant of the  $n \times n$  matrix  $I+A$ , where  $I$  is the  $n \times n$  identity matrix and

$A = \left\| a_{jk} \right\|$  has entries

$$a_{jk} = \cos(j\vartheta + k\vartheta) \text{ for all } j, k.$$

**Publish or Perish**

"Alteration of the platelet serotonin transporter in romantic love," Marazziti D, Akiskal HS, Rossi A, Cassano GB, *Psychological Medicine*, 1999 May;29(3):741-5.

**Murphy's Laws of Math**

The answer to the problem you couldn't work on the exam will become obvious after you hand in your paper.

A professor is one who can speak on any subject -- for precisely fifty minutes

Norbert WIENER

Logic is the hygiene the mathematician practices to keep his ideas healthy

Herrmann WEYL

"Of the many forms of false culture, a premature converse with abstractions is perhaps the most likely to prove fatal to the growth of a masculine vigour of intellect."

George BOOLE

"A scientist can hardly meet with anything more undesirable than to have the foundations give way just as the work is finished. I was put in this position by a letter from Mr. Bertrand Russell when the work was nearly through the press."

Fredrich Ludwig Gottlob FREGE

"Logic is the hygiene the mathematician practices to keep his ideas healthy and strong."

Hermann Klaus Hugo WEYL

"The British Mathematical Colloquium consists of three days of mathematics with no dogs and no wives"

John Henry Constantine WHITEHEAD

"The modern physicist is a quantum theorist on Monday, Wednesday, and Friday and a student of gravitational relativity theory on Tuesday, Thursday, and Saturday. On Sunday he is neither, but is praying to his God that someone, preferably himself, will find the reconciliation between the two views."

Benoit MANDELBROT

48	1	T	(1792) Nikolay Yvanovich LOBACHEVSKY
	2	F	(1831) Paul David Gustav DU BOIS-RAYMOND (1901) George Frederick James TEMPLE
	3	S	(1903) Sidney GOLDSTEIN (1924) John BACKUS
	4	S	(1795) Thomas CARLYLE
49	5	M	(1868) Arnold Johannes Wilhelm SOMMERFELD (1901) Werner Karl HEISENBERG
	6	T	(1682) Giulio Carlo FAGNANO dei Toschi
	7	W	(1647) Giovanni CEVA (1823) Leopold KRONECKER (1830) Antonio Luigi Gaudenzio Giuseppe CREMONA
	8	T	(1508) Regnier GEMMA FRISIUS (1865) Jaques Salomon HADAMARD (1919) Julia Bowman ROBINSON
	9	F	(1883) Nikolai Nikolaevich LUZIN (1906) Grace Brewster MURRAY HOPPER (1917) Sergei Vasilovich FOMIN
	10	S	(1804) Karl Gustav Jacob JACOBI (1815) Augusta Ada KING Countess of LOVELACE
	11	S	(1882) Max BORN
50	12	M	(1832) Peter Ludwig Mejdell SYLOW
	13	T	(1724) Franz Ulrich Theodosius AEPINUS (1887) George POLYA
	14	W	(1546) Tycho BRAHE
	15	T	(1802) Janos BOLYAI
	16	F	(1804) Wiktor Yakovievich BUNYAKOWSKY
	17	S	(1706) Gabrielle Emile Le Tonnelier de Breteuil du CHATELET (1835) Felice CASORATI (1842) Marius Sophus LIE (1900) Dame Mary Lucy CARTWRIGHT
	18	S	(1917) Roger LYNDON
	51	19	M
20		T	(1494) Oronce FINE (1648) Tommaso CEVA (1875) Francesco Paolo CANTELLI
21		W	(1878) Jan LUKASIEVIKZ (1932) John Robert RINGROSE
22		T	(1824) Francesco BRIOSCHI (1859) Otto Ludwig HOLDER (1877) Tommaso BOGGIO (1883) Srinivasa Anjanagar RAMANUJAN
23		F	(1872) Georgii Yurii PPEIFFER
24		S	(1822) Charles HERMITE (1868) Emmanuel LASKER
25		S	(1642) Isaac NEWTON (1900) Antoni ZYGMUND
52	26	M	(1780) Mary Fairfax Greig SOMERVILLE (1791) Charles BABBAGE
	27	T	(1571) Johannes KEPLER (1654) Jacob (Jacques) BERNOULLI
	28	W	(1808) Athanase Louis Victoire DUPRE (1882) Arthur Stanley EDDINGTON (1903) John von NEUMANN
	29	T	(1856) Thomas Jan STIELTJES
	30	F	(1897) Stanislaw SAKS
	31	S	(1872) Volodymyr LEVIYTSKY (1896) Carl Ludwig SIEGEL (1952) Vaughan Frederick Randall JONES

## Putnam 1999 - B6

Let  $S$  be a finite set of integers, each greater than 1. Suppose that for each integer  $n$  there is some  $s \in S$  such that  $GCD(s,n)=1$  or  $GCD(s,n)=s$ . Show that there exist  $s, t \in S$  such that  $GCD(s,t)$  is prime.

## Publish or Perish

"Eye Damage from Christmas Trees," D.J. Brazier, *Lancet*, vol. 2, no. 8415, December 8, 1984, p. 1335.

## Murphy's Laws of Math

Every problem is harder than it looks and takes longer than you expected

Truth is ever to be found in the simplicity, and not in the multiplicity and confusion of things.

Isaac NEWTON

I am too good for philosophy and not good enough for physics. Mathematics is in between.

George POLYA

"Die ganze Zahl schuf der liebe Gott, alles Übrige ist Menschenwerk."

Leopold KRONECKER

"The shortest path between two truths in the real domain passes through the complex domain."

Jaques Salomon HADAMARD

"Now it is quite clear to me that there are no solid spheres in the heavens, and those that have been devised by authors to save the appearances, exist only in their imagination, for the purpose of permitting the mind to conceive the motion which the heavenly bodies trace in their courses."

Tycho BRACHE

"Mathematical discoveries, like springtime violets in the woods, have their season which no human can hasten or retard."

Janos BOLYAI

"I believe there are 15 747 724 136 275 002 577 605 653 961 181 555 468 044 717 914 527 116 709 366 231 425 076 185 631 031 296 296 protons in the universe and the same number of electrons."

Arthur EDDINGTON

"The Analytical Engine weaves algebraic patterns, just as the Jacquard loom weaves flowers and leaves"

Augusta Ada KING Countess of LOVELACE

"An expert is someone who knows some of the worst mistakes that can be made in his subject, and how to avoid them"

Werner Karl HEISENBERG