ENTRY CONSTANTS

[ENTRY CONSTANTS] Authors: Oliver Knill: March 2000 - March 2004 Literature: Some from Mario Livio "The golden ratio", www.mathworld.com David Wells: "The Penguin Dictionary of Curious and Interesting Numbers".

Archimedes Constant, pi

The [Archimedes Constant, pi] $\pi = 3.14159$ is the length of a half circle with radius 1. It is the area of a disc of radius 1.

Bruns constant

[Bruns constant] is the sum of the reciprocals of all twin primes. Brun has proven that this sum converges evenso it is unknown whether there are infinitely many twin primes.

Catalan constant

The [Catalan constant] is defined as the sum $(-1)^n/(2n+1)^2 = 0.91596$.

Champernown's number

[Champernown's number] is 0.12345678910111213... whose digits are those of all natural numbers in succession.

Continued fraction constant

[Continued fraction constant] is the number with continued fraction $(0, 1, 2, 3, 4, 5, 6, ...)$ it is about 0.697774658.

Euler Mascheroni constant

[Euler Mascheroni constant] is defined as the limit of $(1 + 1/2 + 1/3 + ... + 1/n) - \log(n)$ as n goes to infinity.

Aperi constant

[Aperi constant] It is an irrational number $\zeta(3) = 1.20206$, the value of the zeta function at 3. [Feigenbaum constant] When iterating maps $f(x) = ax(1-x)$ on the unit interval the stable periodic orbits bifurcate when varing a. If a_n are the bifurcation values, then $\delta = \lim(a_n - a_{n-1})/(a_{n+1} - a_n)$ is a Feigenbaum constant.

golden ratio

The [golden ratio] is $\tau = (1+\sqrt{5})/2 = 0.618...$ If $1, 1, 2, 3, 5, 8, 13, 21...$ are the Fibonnachi numbers (the next number is always the sum of the two previous once), then the ratio of neighboring entries approaches the golden mean. $13/21 = 0.61904$ is already quite close to the golden mean. The Golden ratio has the continued fraction expansion $[1, 1, 1, 1...]$ which means that the number can be written as $\tau = 1 + 1/(1 + 1/(1 + ...))$. The golden mean is an example of a Diophantine number, a number which can not be approximated well by rational numbers. Especially, it is irrational. The golden ratio is also called "golden mean" or "divine constant".

golden mean

The [golden mean] see golden ratio.

Khinchin constant

The [Khinchin constant] is defined as the limit $(a_1 a_2 ... a_n)^{1/n}$ where $[a_1, a_2, ...]$ is the continued fraction of a random number in the sense that the limit is known to exist for almost all real numbers. It is not known for example, if π is a typical number in the sense that it produces the Khinchin constant.

natural logarithmic base

The [natural logarithmic base] $e = 2.7182818...$ can be defined as $\exp(1) = 1 + 1/1! + 1/2! + 1/3! + ...$ or $\lim_{n\to\infty}(1 + 1/n)^n$.

number of the beast

The [number of the beast] is the integer 666. The "beast" is associated with the "antichrist". The origin of the association is the bible: the book of revelations (13:18) reads: "this calls for wisdom: let anyone with understanding calculate the number of the beast, for it is the number of a man. Its number is six hundred and sixty six."

Pythagoras constant

The [Pythagoras constant] is the square root of 2 $x = \sqrt{2} = 1.41421....$ It is the length of the diagonal of the unit square. It is irrational because $x = p/q$ would imply $2q^2 = x^2 q^2 = p^2$, which is impossible because the prime factorization on the left contains an odd number of 2's, while it contains an even number of 2's on the right.

Smith number

[Smith number] Smith numbers are integers n such that the sum of its digits in the decimal exapansion of n is qual to the sum of the digits of its prime factorization, excluding 1. Smith numbers were defined by A. Wilansky. He called it Smith numbers after his brother in law H. Swmith, whose telephone number $4937775 = 3 * 5 * 5 * 65'837$ is a Smith number. Here are the first Smith numbers: $4, 22, 27, 58, 85, 94, 121, 166, 202, 265....$

Wallis constant

The [Wallis constant] is the real solution to the polynomial x^3-2x+5 which is 2.0945514815.... This equation was solved by the English mathematicaian John Wallis [1616-1703] to illustrate Newton's method for the numerical solution of equations. It has since served as a test for many subsequent methods of approximation.

Zero

[Zero] The integer zero 0 is the neutral element in the additive group of integers $n + 0 = n$.

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