

Important Mathematical Constants

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Abstract

Mathematical constants play an essential role in analysis, geometry, number theory, and chaos theory. This paper provides a curated list of notable constants, their approximate values, symbols, and contextual relevance across various branches of mathematics.

1 Introduction

Mathematical constants are fixed values that appear frequently in diverse mathematical formulas, equations, and theories. Some of these constants emerge from geometry, some from number theory, and others from analysis and dynamical systems.

2 List of Constants

Name	Symbol	Approx. Value	Description
Pi	π	3.1415926535	Ratio of circumference to diameter in a circle
Eulers Number	e	2.7182818284	Base of the natural logarithm, central in calculus
Golden Ratio	φ	1.6180339887	Arises in geometry, art, and recursive sequences
Imaginary Unit	i	$\sqrt{-1}$	Square root of negative one, foundation of complex numbers
Square Root of 2	$\sqrt{2}$	1.4142135623	Diagonal of a unit square
Square Root of 3	$\sqrt{3}$	1.7320508075	Relevant in equilateral triangle geometry
Natural Log of 2	$\ln 2$	0.6931471805	Used in entropy and half-life calculations
Natural Log of 10	$\ln 10$	2.3025850930	Logarithmic scale transformations
EulerMascheroni	γ	0.5772156649	Difference between harmonic series and natural log
Aperys Constant	$\zeta(3)$	1.2020569031	Appears in series and number theory

Name	Symbol	Approx.	Value	Description
Catalan's Constant		G	0.9159655941	Arises in combinatorics and geometry
Khinchins Constant		K_0	2.6854520010	Related to continued fractions statistics
GlaisherKinkelin		A	1.2824271291	Appears in gamma function expansions
Feigenbaum (1)		δ	4.6692016091	Universal scaling constant in bifurcation theory
Feigenbaum (2)		α	2.5029078750	Also in period doubling chaos
Liouville's Constant			0.110001000	Constructed transcendental number
Champernowne Constant		C_{10}	0.1234567891011	Concatenation of decimal integers
Plastic Number		ρ	1.3247179572	Solution to $x^3 = x + 1$, in certain recursive tilings

3 Conclusion

The constants presented are foundational across many branches of mathematics and physics. Their ubiquity underscores deep structural truths within mathematics itself, from the behavior of chaotic systems to the fundamental properties of space and numbers.