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Mathematical constants. (English) Zbl 1054.00001

[Encyclopedia of Mathematics and Its Applications](#) 94. Cambridge: Cambridge University Press (ISBN 0-521-81805-2/hbk). xx, 602 p. (2003).

There are topics that go across all fields of mathematics. Numerical constants are one of them and they are here, for the first time, the object of a systematic investigation. “The emphasis is not on the decimal expansions, but rather on the mathematical origins of the constants and their interrelationships. In short, the stories, not the table, tie the book together.” “My intended audience is advanced undergraduates and beyond (so I may assume readers have had calculus, matrix theory, differential equations, probability, some abstract algebra, and analysis)”.

The book is organized in 8 chapters, a table of constants, an author index, a subject index,

Chapter 1 is devoted to *famous constants*, some of them occurring in elementary mathematics: the Golden Mean, the natural logarithmic base, Pythagoras’ $\sqrt{2}$, Archimedes’ π , Euler-Mascheroni’s γ , Apéry’s $\zeta(3)$, Catalan’s G , and the constants considered by Khintchine-Lévy, Feigenbaum-Couillet-Tresser, Madelung and Chaitin.

Chapter 2 refers to *constants associated with number theory*, involving names such as Hardy-Littlewood, Meissel-Mertens, Landau-Ramanujan, Artin, Hafner-Sarnak-McCurley, Niven, Euler, Pell-Steinhagen, Alladi-Grinstead, Sierpinski, Linnik, Mills, Brun, Glaisher-Kinkelin, Stolarsky-Harborth, Ulam, Gauss-Kuzmin-Wirsing, Porter-Hensley, Vallée, Erdős, Stieltjes, Liouville-Roth, Cameron, Pisot, Freiman, DeBruijn-Newman, Hall-Montgomery.

Chapter 3 is devoted to *constants associated with analytic irregularities* and involve names such as: Shapiro-Drinfeld, Carlson-Levin, Landau-Kolmogorov, Hilbert, Sobolev, Korn, Whitney-Mikhlin, Zolotarev-Schur, Kneser-Mahler, Grothendieck, DuBois Reymond, Steinitz, Young-Fejér-Jackson, Van der Corput, Turán.

Constants associated with approximation of functions are considered in Chapter 4 and involve names such as: Gibbs-Wilbraham, Lebesgue, Akhiezer-Krein-Favard, Bernstein, Fransén-Robinson, Berry-Esseen, Laplace, Chebyshev.

In Chapter 5, related to *constants associated to enumerating discrete structures*, involve names such as: Rényi, Golomb-Dickman, Kalmár, Otter, Lengyel, Pólya, Feller, Klarner, Lieb. Tutte.

Constants associated with functional iteration (Chapter 6) involve names such as: Gauss, Weierstrass, Euler-Gompertz, Kepler-Bouwkamp, Cahen, Lehmer, Plouffe, Grossman, Prouhet-Thue-Morse, Minkowski-Bower, Conway.

In *complex analysis* (Chapter 7): Bloch-Landau, Masser-Gramain, Whittaker-Goncharov, John, Hayman, Littlewood-Clunie-Pommerenke, Riesz-Kolmogorov, Grötzsch.

In *geometry* (Chapter 8): Moser, Sterner, Hermite, Calabi, DeVicci, Graham, Heilbronn, Kakeya-Besicovitch.

This book is a valuable source of information and of suggestions for further research. A natural continuation could be related to mathematical constants in applied fields, such as mathematical computer science, probability, mathematical physics etc. Important aspects of human relations point out the meaning and the significance of some natural numbers, such as 1, 2, 3, 4, 5, 7 (see G. Miller’s “magical number seven”) etc. Finch’s book enables to develop bald analogies, such as between the Conway’s constant and the golden ratio.

Reviewer: [Solomon Marcus \(București\)](#)

MSC:

- [00A20](#) Dictionaries and other general reference works
- [00A05](#) Mathematics in general
- [11Y60](#) Evaluation of number-theoretic constants

Cited in **1** Review
Cited in **102** Documents

Keywords:

constants; number theory; analytic inequalities; approximation of functions; functional iterations complex analysis