

Bernoulli Numbers And Zeta Functions Springer Monographs In Mathematics

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 L-Functions
 (Almost) Impossible Integrals, Sums, and Series
 The Partition Method for a Power Series Expansion
 From Arithmetic to Zeta-Functions
 The Riemann Hypothesis
 Modern Computer Arithmetic
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 Complex Dimensions of Fractal Strings and Zeros of Zeta Functions
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Elementary Theory of Numbers

Springer Science & Business Media
 Designed as a reference work and also as a graduate-level textbook, this volume presents an up-to-date and comprehensive account of the theories and applications of the various methods and techniques used in dealing with problems involving closed-form evaluations of (and representations of the Riemann Zeta function at positive integer arguments as) numerous families of series associated with the Riemann Zeta function, the Hurwitz Zeta function, and

their extensions and generalizations such as Lerch's transcendent (or the Hurwitz-Lerch Zeta function). Audience: This book is intended for professional mathematicians and graduate students in mathematical sciences (both pure and applied).
 L-Functions Springer
 Hailed as one of the greatest mathematical results of the twentieth century, the recent proof of Fermat's Last Theorem by Andrew Wiles brought to public attention the enigmatic problem-solver Pierre de Fermat, who centuries ago stated his famous conjecture in a margin of a book, writing that he did not have enough room to show his "truly marvelous demonstration." Along with formulating this proposition-- $x^n + y^n = z^n$ has no rational

solution for $n > 2$ --Fermat, an inventor of analytic geometry, also laid the foundations of differential and integral calculus, established, together with Pascal, the conceptual guidelines of the theory of probability, and created modern number theory. In one of the first full-length investigations of Fermat's life and work, Michael Sean Mahoney provides rare insight into the mathematical genius of a hobbyist who never sought to publish his work, yet who ranked with his contemporaries Pascal and Descartes in shaping the course of modern mathematics.
 (Almost) Impossible Integrals, Sums, and Series World Scientific
 Since the publication of the first edition of this work, considerable progress has been

made in many of the questions examined. This edition has been updated and enlarged, and the bibliography has been revised. The variety of topics covered here includes divisibility, diophantine equations, prime numbers (especially Mersenne and Fermat primes), the basic arithmetic functions, congruences, the quadratic reciprocity law, expansion of real numbers into decimal fractions, decomposition of integers into sums of powers, some other problems of the additive theory of numbers and the theory of Gaussian integers.

The Partition Method for a Power Series Expansion Springer Science & Business Media

This survey explores the history of the arithmetical triangle, from its roots in Pythagorean arithmetic, Hindu combinatorics, and Arabic algebra to its influence on Newton and Leibniz as well as modern-day mathematicians.

From Arithmetic to Zeta-Functions Springer Science & Business Media

"This book is the first volume of a two-volume textbook for undergraduates and is indeed the crystallization of a course offered by the author at the California Institute of Technology to undergraduates without any previous knowledge of number theory. For this reason, the book starts with the most elementary properties of the natural integers. Nevertheless, the text succeeds in presenting an enormous amount of material in little more than 300 pages."—MATHEMATICAL REVIEWS
The Riemann Hypothesis American Mathematical Soc.

A fractal drum is a bounded open subset of \mathbb{R}^m with a fractal boundary. A difficult problem is to describe the relationship between the shape (geometry) of the drum and its sound (its spectrum). In this book, we restrict ourselves to the one-dimensional case of fractal strings, and their higher dimensional analogues, fractal sprays. We develop a theory of complex dimensions of a fractal string, and we study how these complex dimensions relate the geometry with the spectrum of the fractal string. We refer the reader to [Berr1-2, Lap1-4, LapPol-3, LapMal-2, HeLapl-2] and the references therein for further physical and mathematical motivations of this work. (Also see, in particular, Sections 7.1, 10.3 and 10.4, along with Appendix B.) In Chapter 1, we introduce the basic object of our research, fractal strings (see [Lapl-3, LapPol-3, LapMal-2, HeLapl-2]). A 'standard fractal string' is a bounded open subset of the real line. Such a set is a disjoint union of open intervals, the lengths of which form a sequence which we assume to be infinite. Important

information about the geometry of c is contained in its geometric zeta function $\zeta_c(s) = \sum_{j=1}^{\infty} l_j^{-s}$. Introduction We assume throughout that this function has a suitable meromorphic extension. The central notion of this book, the complex dimensions of a fractal string c , is defined as the poles of the meromorphic extension of ζ_c .

Modern Computer Arithmetic Springer Science & Business Media

"For centuries, mathematicians have tried, and failed, to solve the zeta-3 problem. This problem is simple in its formulation, but remains unsolved to this day, despite the attempts of some of the world's greatest mathematicians to solve it. The problem can be stated as follows: is there a simple symbolic formula for the following sum: $1 + (1/2)^3 + (1/3)^3 + (1/4)^3 + \dots$? Although it is possible to calculate the approximate numerical value of the sum (for those interested, it's 1.20205...), there is no known symbolic expression. A symbolic formula would not only provide an exact value for the sum, but would allow for greater insight into its characteristics and properties. The answers to these questions are not of purely academic interest; the zeta-3 problem has close connections to physics, engineering, and other areas of mathematics. Zeta-3 arises in quantum electrodynamics and in number theory, for instance, and it is closely connected to the Riemann hypothesis. In *In Pursuit of zeta-3*, Paul Nahin turns his sharp, witty eye on the zeta-3 problem. He describes the problem's history, and provides numerous "challenge questions" to engage readers, along with Matlab code. Unlike other, similarly challenging problems, anyone with a basic mathematical background can understand the problem-making it an ideal choice for a pop math book"–

Advanced Combinatorics Cambridge University Press

Modern Computer Arithmetic focuses on arbitrary-precision algorithms for efficiently performing arithmetic operations such as addition, multiplication and division, and their connections to topics such as modular arithmetic, greatest common divisors, the Fast Fourier Transform (FFT), and the computation of elementary and special functions. Brent and Zimmermann present algorithms that are ready to implement in your favourite language, while keeping a high-level description and avoiding too low-level or machine-dependent details. The book is intended for anyone interested in the design and implementation of efficient high-precision algorithms for computer

arithmetic, and more generally efficient multiple-precision numerical algorithms. It may also be used in a graduate course in mathematics or computer science, for which exercises are included. These vary considerably in difficulty, from easy to small research projects, and expand on topics discussed in the text. Solutions to selected exercises are available from the authors.

Complex Dimensions of Fractal Strings and Zeros of Zeta Functions Springer Science & Business Media

This is the first introductory book on multiple zeta functions and multiple polylogarithms which are the generalizations of the Riemann zeta function and the classical polylogarithms, respectively, to the multiple variable setting. It contains all the basic concepts and the important properties of these functions and their special values. This book is aimed at graduate students, mathematicians and physicists who are interested in this current active area of research. The book will provide a detailed and comprehensive introduction to these objects, their fascinating properties and interesting relations to other mathematical subjects, and various generalizations such as their q -analogs and their finite versions (by taking partial sums modulo suitable prime powers). Historical notes and exercises are provided at the end of each chapter. Contents: Multiple Zeta Functions Multiple Polylogarithms (MPLs) Multiple Zeta Values (MZVs) Drinfeld Associator and Single-Valued MZVs Multiple Zeta Value Identities Symmetrized Multiple Zeta Values (SMZVs) Multiple Harmonic Sums (MHSs) and Alternating Version Finite Multiple Zeta Values and Finite Euler Sums q -Analogues of Multiple Harmonic (Star) Sums Readership: Advanced undergraduates and graduate students in mathematics, mathematicians interested in multiple zeta values. Key Features: For the first time, a detailed explanation of the theory of multiple zeta values is given in book form along with numerous illustrations in explicit examples The book provides for the first time a comprehensive introduction to multiple polylogarithms and their special values at roots of unity, from the basic definitions to the more advanced topics in current active research The book contains a few quite intriguing results relating the special values of multiple zeta functions and multiple polylogarithms to other branches of mathematics and physics, such as knot theory and the theory of motives Many exercises contain supplementary materials which deepens the reader's understanding of the main text

Analytic Number Theory, Approximation Theory, and Special Functions World Scientific

Bernoulli Numbers and Zeta Functions Springer

Automorphic Forms and Zeta Functions Walter de Gruyter

This book examines the huge scope of mathematical areas explored and developed by Leonhard Euler.

In Honor of the Ninetieth Birthday of I.M. Gelfand Elsevier

The aim of the series is to present new and important developments in pure and applied mathematics. Well established in the community over two decades, it offers a large library of mathematics including several important classics. The volumes supply thorough and detailed expositions of the methods and ideas essential to the topics in question. In addition, they convey their relationships to other parts of mathematics. The series is addressed to advanced readers wishing to thoroughly study the topic. Editorial Board Lev Birbrair, Universidade Federal do Ceará, Fortaleza, Brasil Victor P. Maslov, Russian Academy of Sciences, Moscow, Russia Walter D. Neumann, Columbia University, New York, USA Markus J. Pflaum, University of Colorado, Boulder, USA Dierk Schleicher, Jacobs University, Bremen, Germany

Generalized Multiple Zeta Functions and P-adic Q-Bernoulli Numbers World Scientific

This book is a revised and greatly expanded version of our book *Elements of Number Theory* published in 1972. As with the first book the primary audience we envisage consists of upper level undergraduate mathematics majors and graduate students. We have assumed some familiarity with the material in a standard undergraduate course in abstract algebra. A large portion of Chapters 1-11 can be read even without such background with the aid of a small amount of supplementary reading. The later chapters assume some knowledge of Galois theory, and in Chapters 16 and 18 an acquaintance with the theory of complex variables is necessary. Number theory is an ancient subject and its content is vast. Any introductory book must, of necessity, make a very limited selection from the fascinating array of possible topics. Our focus is on topics which point in the direction of algebraic number theory and arithmetic algebraic geometry. By a careful selection of subject matter we have found it possible to exposit some rather advanced material without requiring very much in the way of technical background. Most of this

material is classical in the sense that it was discovered during the nineteenth century and earlier, but it is also modern because it is intimately related to important research going on at the present time.

The Story of a Mathematical Idea

Cambridge University Press

This book, in honor of Hari M. Srivastava, discusses essential developments in mathematical research in a variety of problems. It contains thirty-five articles, written by eminent scientists from the international mathematical community, including both research and survey works. Subjects covered include analytic number theory, combinatorics, special sequences of numbers and polynomials, analytic inequalities and applications, approximation of functions and quadratures, orthogonality and special and complex functions. The mathematical results and open problems discussed in this book are presented in a simple and self-contained manner. The book contains an overview of old and new results, methods, and theories toward the solution of longstanding problems in a wide scientific field, as well as new results in rapidly progressing areas of research. The book will be useful for researchers and graduate students in the fields of mathematics, physics and other computational and applied sciences.

The Riemann Zeta-Function Springer Science & Business Media

This book presents the most recent scientific and technological advances in the fields of engineering mathematics and computational science, to strengthen the links in the scientific community. It is a collection of high-quality, peer-reviewed research papers presented at the First International Conference on Mathematical Modeling and Computational Science (ICMMCS 2020), held in Pattaya, Thailand, during 14-15 August 2020. The topics covered in the book are mathematical logic and foundations, numerical analysis, neural networks, fuzzy set theory, coding theory, higher algebra, number theory, graph theory and combinatorics, computation in complex networks, calculus, differential equations and integration, application of soft computing, knowledge engineering, machine learning, artificial intelligence, big data and data analytics, high-performance computing, network and device security, and Internet of things (IoT).

VARIOUS ASPECTS OF MULTIPLE ZETA FUNCTIONS IN HONOR OF PROFESSOR KOHJI MATSUMOTO'S 60TH BIRTHDAY.

Springer Science & Business Media

This book presents a method for

evaluating Selberg zeta functions via transfer operators for the full modular group and its congruence subgroups with characters. Studying zeros of Selberg zeta functions for character deformations allows us to access the discrete spectra and resonances of hyperbolic Laplacians under both singular and non-singular perturbations. Areas in which the theory has not yet been sufficiently developed, such as the spectral theory of transfer operators or the singular perturbation theory of hyperbolic Laplacians, will profit from the numerical experiments discussed in this book. Detailed descriptions of numerical approaches to the spectra and eigenfunctions of transfer operators and to computations of Selberg zeta functions will be of value to researchers active in analysis, while those researchers focusing more on numerical aspects will benefit from discussions of the analytic theory, in particular those concerning the transfer operator method and the spectral theory of hyperbolic spaces.

Proceedings of First International Conference on Mathematical Modeling and Computational Science

Springer Nature

This book collects more than thirty contributions in memory of Wolfgang Schwarz, most of which were presented at the seventh International Conference on Elementary and Analytic Number Theory (ELAZ), held July 2014 in Hildesheim, Germany. Ranging from the theory of arithmetical functions to diophantine problems, to analytic aspects of zeta-functions, the various research and survey articles cover the broad interests of the well-known number theorist and cherished colleague Wolfgang Schwarz (1934-2013), who contributed over one hundred articles on number theory, its history and related fields. Readers interested in elementary or analytic number theory and related fields will certainly find many fascinating topical results among the contributions from both respected mathematicians and up-and-coming young researchers. In addition, some biographical articles highlight the life and mathematical works of Wolfgang Schwarz.

Automorphic Forms and Zeta Functions Springer

This is a first-ever textbook written in English about the theory of modular forms and Jacobi forms of several variables. It contains the classical theory as well as a new theory on Jacobi forms over Cayley numbers developed by the author from 1990 to 2000. Applications to the classical Euler sums are of special interest to those who are eager to evaluate double Euler sums or more general multiple zeta

values. The celebrated sum formula proved by Granville in 1997 is generalized to a more general form here.

Proceedings of the Conference in Memory of Tsuneo Arakawa : Rikkyo University, Japan, 4-7 September 2004 Springer Science & Business Media

Tribute to the vision and legacy of Israel Moiseevich Gel'fand Written by leading mathematicians, these invited papers reflect the unity of mathematics as a whole, with particular emphasis on the many connections among the fields of geometry, physics, and representation theory Topics include conformal field theory, K-theory, noncommutative geometry, gauge theory, representations of infinite-dimensional Lie algebras, and various aspects of the Langlands program

History of Zeta Functions Princeton University Press

This monograph provides an introduction to the theory of Clifford algebras, with an emphasis on its connections with the theory of Lie groups and Lie algebras. The book starts with a detailed presentation of the main results on symmetric bilinear forms and Clifford algebras. It develops the spin groups and the spin representation, culminating in Cartan's famous triality automorphism for the group Spin(8). The discussion of enveloping algebras includes a presentation of Petracchi's proof of the Poincaré-Birkhoff-Witt theorem. This is followed by discussions of Weil algebras, Chern-Weil theory, the quantum Weil

algebra, and the cubic Dirac operator. The applications to Lie theory include Duflo's theorem for the case of quadratic Lie algebras, multiplets of representations, and Dirac induction. The last part of the book is an account of Kostant's structure theory of the Clifford algebra over a semisimple Lie algebra. It describes his "Clifford algebra analogue" of the Hopf-Koszul-Samelson theorem, and explains his fascinating conjecture relating the Harish-Chandra projection for Clifford algebras to the principal $\mathfrak{sl}(2)$ subalgebra. Aside from these beautiful applications, the book will serve as a convenient and up-to-date reference for background material from Clifford theory, relevant for students and researchers in mathematics and physics.

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