

The Riemann Zeta Function Theory And Applications Aleksandar Ivic

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Spectral Theory of the Riemann Zeta-Function - Yoichi Motohashi 1997-09-11

The Riemann zeta function is one of the most studied objects in mathematics, and is of fundamental importance. In this book, based on his own research, Professor Motohashi shows that the function is

closely bound with automorphic forms and that many results from there can be woven with techniques and ideas from analytic number theory to yield new insights into, and views of, the zeta function itself. The story starts with an elementary but unabridged treatment of the

spectral resolution of the non-Euclidean Laplacian and the trace formulas. This is achieved by the use of standard tools from analysis rather than any heavy machinery, forging a substantial aid for beginners in spectral theory as well. These ideas are then utilized to unveil an image of the zeta-function, first perceived by the author, revealing it to be the main gem of a necklace composed of all automorphic L-functions. In this book, readers will find a detailed account of one of the most fascinating stories in the development of number theory, namely the fusion of two main fields in mathematics that were previously studied separately.

Exploring the Riemann Zeta Function - Hugh Montgomery
2017-09-11

Exploring the Riemann Zeta Function: 190 years from Riemann's Birth presents a collection of chapters contributed by eminent experts devoted to the Riemann Zeta Function, its generalizations, and their various applications to several scientific disciplines, including Analytic Number

Theory, Harmonic Analysis, Complex Analysis, Probability Theory, and related subjects. The book focuses on both old and new results towards the solution of long-standing problems as well as it features some key historical remarks. The purpose of this volume is to present in a unified way broad and deep areas of research in a self-contained manner. It will be particularly useful for graduate courses and seminars as well as it will make an excellent reference tool for graduate students and researchers in Mathematics, Mathematical Physics, Engineering and Cryptography.

Zeta Functions of Groups and Rings - Marcus du Sautoy
2008

The study of the subgroup growth of finite groups is an area of mathematical research that has grown rapidly since its inception at the Groups St. Andrews conference in 1985. It has become a rich theory requiring tools from and having applications to many areas of group theory. Indeed, much of this progress is

chronicled by Lubotzky and Segal within their book [42]. However, one area within this study has grown explosively in the last few years. This is the study of the zeta functions of groups with polynomial s-group growth, in particular torsion-free nilpotent groups. These zeta functions were introduced in [32], and other key papers in the development of this subject include [10, 17], with [19, 23, 15] as well as [42] presenting surveys of the area. The purpose of this book is to bring into print significant and as yet unpublished work from three areas of the theory of zeta functions of groups. First, there are now numerous calculations of zeta functions of groups by doctoral students of the first author which are yet to be made into printed form outside their theses. These explicit calculations provide evidence in favour of conjectures, or indeed can form inspiration and evidence for new conjectures. We record these zeta functions in Chap. 2. In particular, we document the

functional equations frequently satisfied by the local factors. Explaining this phenomenon is, according to the first author and Segal [23], "one of the most intriguing open problems in the area".

Zeta Regularization Techniques With Applications - Andrei A Bytsenko 1994-05-16

This book is the result of several years of work by the authors on different aspects of zeta functions and related topics. The aim is twofold. On one hand, a considerable number of useful formulas, essential for dealing with the different aspects of zeta-function regularization (analytic continuation, asymptotic expansions), many of which appear here, in book format, for the first time are presented. On the other hand, the authors show explicitly how to make use of such formulas and techniques in practical applications to physical problems of very different nature. Virtually all types of zeta functions are dealt with in the book.

The Distribution of Prime

Numbers - A. E. Ingham

1990-09-28

Originally published in 1934, this volume presents the theory of the distribution of the prime numbers in the series of natural numbers. Despite being long out of print, it remains unsurpassed as an introduction to the field.

The Lerch zeta-function -

Antanas Laurincikas 2002

This monograph is a generalization of the classic Riemann, and Hurwitz zeta-functions, containing both analytic and probability theory of Lerch zeta-functions.

Applied Mathematics - F. J.

Murray 2013-06-29

The primary objective of the course presented here is orientation for those interested in applying mathematics, but the course should also be of value or in using math to those interested in mathematical research and teaching ematics in some other professional context. The course should be suitable for college seniors and graduate students, as well as for college juniors who have had mathematics beyond the

basic calculus sequence.

Maturity is more significant than any formal prerequisite.

The presentation involves a number of topics that are significant for applied mathematics but that normally do not appear in the curriculum or are depicted from an entirely different point of view. These topics include engineering simulations, the experience patterns of the exact sciences, the conceptual nature of pure mathematics and its relation to applied mathematics, the historical development of mathematics, the associated conceptual aspects of the exact sciences, and the metaphysical implications of mathematical scientific theories. We will associate topics in mathematics with areas of application. This presentation corresponds to a certain logical structure. But there is an enormous wealth of intellectual development available, and this permits considerable flexibility for the instructor in curricula and emphasis. The prime objective is to encourage the student to

contact and utilize this rich heritage. Thus, the student's activity is critical, and it is also critical that this activity be precisely formulated and communicated.

50 Years with Hardy Spaces

- Anton Baranov 2019-02-08

Written in honor of Victor Havin (1933-2015), this volume presents a collection of surveys and original papers on harmonic and complex analysis, function spaces and related topics, authored by internationally recognized experts in the fields. It also features an illustrated scientific biography of Victor Havin, one of the leading analysts of the second half of the 20th century and founder of the Saint Petersburg Analysis Seminar. A complete list of his publications, as well as his public speech "Mathematics as a source of certainty and uncertainty", presented at the Doctor Honoris Causa ceremony at Linköping University, are also included.

Zeta and Q-Zeta Functions and Associated Series and

Integrals - H. M. Srivastava
2011-10-25

Zeta and q-Zeta Functions and Associated Series and Integrals is a thoroughly revised, enlarged and updated version of Series Associated with the Zeta and Related Functions. Many of the chapters and sections of the book have been significantly modified or rewritten, and a new chapter on the theory and applications of the basic (or q-) extensions of various special functions is included. This book will be invaluable because it covers not only detailed and systematic presentations of the theory and applications of the various methods and techniques used in dealing with many different classes of series and integrals associated with the Zeta and related functions, but stimulating historical accounts of a large number of problems and well-classified tables of series and integrals. Detailed and systematic presentations of the theory and applications of the various methods and techniques used in dealing with many different

classes of series and integrals associated with the Zeta and related functions

Fundamental Number Theory with Applications, Second Edition - Richard A. Mollin 2008-02-21

An update of the most accessible introductory number theory text available, *Fundamental Number Theory with Applications, Second Edition* presents a mathematically rigorous yet easy-to-follow treatment of the fundamentals and applications of the subject. The substantial amount of reorganizing makes this edition clearer and more elementary in its coverage. New to the Second Edition • Removal of all advanced material to be even more accessible in scope • New fundamental material, including partition theory, generating functions, and combinatorial number theory • Expanded coverage of random number generation, Diophantine analysis, and additive number theory • More applications to cryptography, primality testing, and factoring

• An appendix on the recently discovered unconditional deterministic polynomial-time algorithm for primality testing Taking a truly elementary approach to number theory, this text supplies the essential material for a first course on the subject. Placed in highlighted boxes to reduce distraction from the main text, nearly 70 biographies focus on major contributors to the field. The presentation of over 1,300 entries in the index maximizes cross-referencing so students can find data with ease.

Limit Theorems for the Riemann Zeta-Function - Antanas Laurincikas 2013-03-09

The subject of this book is probabilistic number theory. In a wide sense probabilistic number theory is part of the analytic number theory, where the methods and ideas of probability theory are used to study the distribution of values of arithmetic objects. This is usually complicated, as it is difficult to say anything about their concrete values. This is why the following problem is

usually investigated: given some set, how often do values of an arithmetic object get into this set? It turns out that this frequency follows strict mathematical laws. Here we discover an analogy with quantum mechanics where it is impossible to describe the chaotic behaviour of one particle, but that large numbers of particles obey statistical laws. The objects of investigation of this book are Dirichlet series, and, as the title shows, the main attention is devoted to the Riemann zeta-function. In studying the distribution of values of Dirichlet series the weak convergence of probability measures on different spaces (one of the principle asymptotic probability theory methods) is used. The application of this method was launched by H. Bohr in the third decade of this century and it was implemented in his works together with B. Jessen. Further development of this idea was made in the papers of B. Jessen and A. Wintner, V. Borhsenius and B.

The Theory of Functions -
Edward Charles Titchmarsh
2002

Zeta Functions of Graphs -
Audrey Terras 2010-11-18
Graph theory meets number theory in this stimulating book. Ihara zeta functions of finite graphs are reciprocals of polynomials, sometimes in several variables. Analogies abound with number-theoretic functions such as Riemann/Dedekind zeta functions. For example, there is a Riemann hypothesis (which may be false) and prime number theorem for graphs. Explicit constructions of graph coverings use Galois theory to generalize Cayley and Schreier graphs. Then non-isomorphic simple graphs with the same zeta are produced, showing you cannot hear the shape of a graph. The spectra of matrices such as the adjacency and edge adjacency matrices of a graph are essential to the plot of this book, which makes connections with quantum chaos and random matrix theory, plus expander/Ramanujan graphs of

interest in computer science. Created for beginning graduate students, the book will also appeal to researchers. Many well-chosen illustrations and exercises, both theoretical and computer-based, are included throughout.

The Riemann Zeta-Function - Aleksandar Ivic 2012-07-12

This text covers exponential integrals and sums, 4th power moment, zero-free region, mean value estimates over short intervals, higher power moments, omega results, zeros on the critical line, zero-density estimates, and more. 1985 edition.

An Introduction to the Theory of the Riemann Zeta-Function - S. J. Patterson 1995-02-02

An introduction to the analytic techniques used in the investigation of zeta functions through the example of the Riemann zeta function. It emphasizes central ideas of broad application, avoiding technical results and the customary function-theoretic approach.

Prime Numbers and the Riemann Hypothesis - Barry

Mazur 2016-04-11

This book introduces prime numbers and explains the famous unsolved Riemann hypothesis.

Trigonometric Sums and Their Applications - Andrei

Raigorodskii 2020-03-11

This volume presents in a unified manner both classic as well as modern research results devoted to trigonometric sums. Such sums play an integral role in the formulation and understanding of a broad spectrum of problems which range over surprisingly many and different research areas. Fundamental and new developments are presented to discern solutions to problems across several scientific disciplines. Graduate students and researchers will find within this book numerous examples and a plethora of results related to trigonometric sums through pure and applied research along with open problems and new directions for future research.

The Riemann Zeta-function - A. Ivi? 2003-01-01

Comprehensive and coherent,

this text covers exponential integrals and sums, 4th power moment, zero-free region, mean value estimates over short intervals, higher power moments, omega results, zeros on the critical line, zero-density estimates, distribution of primes, Dirichlet and various other divisor problems, and more. 1985 edition.

Complex Numbers - S C Roy
2007-07-01

An informative and useful account of complex numbers that includes historical anecdotes, ideas for further research, outlines of theory and a detailed analysis of the ever-elusory Riemann hypothesis. Stephen Roy assumes no detailed mathematical knowledge on the part of the reader and provides a fascinating description of the use of this fundamental idea within the two subject areas of lattice simulation and number theory. *Complex Numbers* offers a fresh and critical approach to research-based implementation of the mathematical concept of imaginary numbers. Detailed

coverage includes: Riemann's zeta function: an investigation of the non-trivial roots by Euler-Maclaurin summation. Basic theory: logarithms, indices, arithmetic and integration procedures are described. Lattice simulation: the role of complex numbers in Paul Ewald's important work of the 1920s is analysed.

Mangoldt's study of the xi function: close attention is given to the derivation of $N(T)$ formulae by contour integration. Analytical calculations: used extensively to illustrate important theoretical aspects. Glossary: over 80 terms included in the text are defined. Offers a fresh and critical approach to the research-based implication of complex numbers Includes historical anecdotes, ideas for further research, outlines of theory and a detailed analysis of the Riemann hypothesis Bridges any gaps that might exist between the two worlds of lattice sums and number theory

Riemann's Zeta Function -
Harold M. Edwards 2001-01-01

Superb high-level study of one of the most influential classics in mathematics examines landmark 1859 publication entitled "On the Number of Primes Less Than a Given Magnitude," and traces developments in theory inspired by it. Topics include Riemann's main formula, the prime number theorem, the Riemann-Siegel formula, large-scale computations, Fourier analysis, and other related topics. English translation of Riemann's original document appears in the Appendix.

Lectures on Mean Values of the Riemann Zeta Function - A. Ivic 1991

This is an advanced text on the Riemann zeta-function, a continuation of the author's earlier book. It presents the most recent results on mean values, many of which had not yet appeared in print at the time of the writing of the text. An especially detailed discussion is given of the second and the fourth moment, and the latter is studied by the use of spectral theory, one of the most powerful methods

used lately in analytic number theory. The book presupposes a reasonable knowledge of zeta-function theory and complex analysis. It will be of great use to the researchers in the field, as to all those who wish to get well acquainted with the subject or who have the need for application of zeta-function theory.

Fractal Geometry, Complex Dimensions and Zeta

Functions - Michel Lapidus

2012-09-20

Number theory, spectral geometry, and fractal geometry are interlinked in this in-depth study of the vibrations of fractal strings, that is, one-dimensional drums with fractal boundary. Throughout *Geometry, Complex Dimensions and Zeta Functions*, Second Edition, new results are examined and a new definition of fractality as the presence of nonreal complex dimensions with positive real parts is presented. The new final chapter discusses several new topics and results obtained since the publication of the first edition.

Multiple Dirichlet Series, Automorphic Forms, and Analytic Number Theory -

Bretton Woods Workshop on Multiple Dirichlet Series 2006

Multiple Dirichlet series are Dirichlet series in several complex variables. A multiple Dirichlet series is said to be perfect if it satisfies a finite group of functional equations and has meromorphic continuation everywhere. The earliest examples came from Mellin transforms of metaplectic Eisenstein series and have been intensively studied over the last twenty years. More recently, many other examples have been discovered and it appears that all the classical theorems on moments of L -functions as well as the conjectures (such as those predicted by random matrix theory) can now be obtained via the theory of multiple Dirichlet series. Furthermore, new results, not obtainable by other methods, are just coming to light. This volume offers an account of some of the major research to date and the

opportunities for the future. It includes an exposition of the main results in the theory of multiple Dirichlet series, and papers on moments of zeta- and L -functions, on new examples of multiple Dirichlet series, and on developments in the allied fields of automorphic forms and analytic number theory.

Zeta and L -functions in Number Theory and Combinatorics - Wen-Ching Winnie Li 2019-03-01

Zeta and L-functions play a central role in number theory. They provide important information of arithmetic nature. This book, which grew out of the author's teaching over several years, explores the interaction between number theory and combinatorics using zeta and L-functions as a central theme. It provides a systematic and comprehensive account of these functions in a combinatorial setting and establishes, among other things, the combinatorial counterparts of celebrated results in number theory, such as the prime number theorem

and the Chebotarev density theorem. The spectral theory for finite graphs and higher dimensional complexes is studied. Of special interest in theory and applications are the spectrally extremal objects, called Ramanujan graphs and Ramanujan complexes, which can be characterized by their associated zeta functions satisfying the Riemann Hypothesis. Explicit constructions of these extremal combinatorial objects, using number-theoretic and combinatorial means, are presented. Research on zeta and L-functions for complexes other than graphs emerged only in recent years. This is the first book for graduate students and researchers offering deep insight into this fascinating and fast developing area.

Modular Functions and Dirichlet Series in Number Theory

- Tom M. Apostol
2012-12-06

A new edition of a classical treatment of elliptic and modular functions with some of their number-theoretic

applications, this text offers an updated bibliography and an alternative treatment of the transformation formula for the Dedekind eta function. It covers many topics, such as Hecke's theory of entire forms with multiplicative Fourier coefficients, and the last chapter recounts Bohr's theory of equivalence of general Dirichlet series.

The Riemann Hypothesis

- Peter B. Borwein 2008

The Riemann Hypothesis has become the Holy Grail of mathematics in the century and a half since 1859 when Bernhard Riemann, one of the extraordinary mathematical talents of the 19th century, originally posed the problem. While the problem is notoriously difficult, and complicated even to state carefully, it can be loosely formulated as "the number of integers with an even number of prime factors is the same as the number of integers with an odd number of prime factors." The Hypothesis makes a very precise connection between two seemingly unrelated

mathematical objects, namely prime numbers and the zeros of analytic functions. If solved, it would give us profound insight into number theory and, in particular, the nature of prime numbers. This book is an introduction to the theory surrounding the Riemann Hypothesis. Part I serves as a compendium of known results and as a primer for the material presented in the 20 original papers contained in Part II. The original papers place the material into historical context and illustrate the motivations for research on and around the Riemann Hypothesis. Several of these papers focus on computation of the zeta function, while others give proofs of the Prime Number Theorem, since the Prime Number Theorem is so closely connected to the Riemann Hypothesis. The text is suitable for a graduate course or seminar or simply as a reference for anyone interested in this extraordinary conjecture.

First European Congress of Mathematics Paris, July

6-10, 1992 - Anthony Joseph 1994-07

Table of Contents: D. Duffie: Martingales, Arbitrage, and Portfolio Choice • J. Fröhlich: Mathematical Aspects of the Quantum Hall Effect • M. Giaquinta: Analytic and Geometric Aspects of Variational Problems for Vector Valued Mappings • U. Hamenstädt: Harmonic Measures for Leafwise Elliptic Operators Along Foliations • M. Kontsevich: Feynman Diagrams and Low-Dimensional Topology • S.B. Kuksin: KAM-Theory for Partial Differential Equations • M. Laczkovich: Paradoxical Decompositions: A Survey of Recent Results • J.-F. Le Gall: A Path-Valued Markov Process and its Connections with Partial Differential Equations • I. Madsen: The Cyclotomic Trace in Algebraic K-Theory • A.S. Merkurjev: Algebraic K-Theory and Galois Cohomology • J. Nekovář: Values of L-Functions and p-Adic Cohomology • Y.A. Neretin: Mantles, Trains and Representations of Infinite Dimensional Groups • M.A.

Nowak: The Evolutionary Dynamics of HIV Infections • R. Piene: On the Enumeration of Algebraic Curves - from Circles to Instantons • A. Quarteroni: Mathematical Aspects of Domain Decomposition Methods • A. Schrijver: Paths in Graphs and Curves on Surfaces • B. Silverman: Function Estimation and Functional Data Analysis • V. Strassen: Algebra and Complexity • P. Tukia: Generalizations of Fuchsian and Kleinian Groups • C. Viterbo: Properties of Embedded Lagrange Manifolds • D. Voiculescu: Alternative Entropies in Operator Algebras • M. Wodzicki : Algebraic K-Theory and Functional Analysis • D. Zagier: Values of Zeta Functions and Their Applications

Quantized Number Theory, Fractal Strings And The Riemann Hypothesis: From Spectral Operators To Phase Transitions And Universality - Hafedh Herichi 2021-07-27

Studying the relationship between the geometry, arithmetic and spectra of

fractals has been a subject of significant interest in contemporary mathematics. This book contributes to the literature on the subject in several different and new ways. In particular, the authors provide a rigorous and detailed study of the spectral operator, a map that sends the geometry of fractal strings onto their spectrum. To that effect, they use and develop methods from fractal geometry, functional analysis, complex analysis, operator theory, partial differential equations, analytic number theory and mathematical physics. Originally, M L Lapidus and M van Frankenhuysen 'heuristically' introduced the spectral operator in their development of the theory of fractal strings and their complex dimensions, specifically in their reinterpretation of the earlier work of M L Lapidus and H Maier on inverse spectral problems for fractal strings and the Riemann hypothesis. One of the main themes of the book is to provide a rigorous

framework within which the corresponding question 'Can one hear the shape of a fractal string?' or, equivalently, 'Can one obtain information about the geometry of a fractal string, given its spectrum?' can be further reformulated in terms of the invertibility or the quasi-invertibility of the spectral operator. The infinitesimal shift of the real line is first precisely defined as a differentiation operator on a family of suitably weighted Hilbert spaces of functions on the real line and indexed by a dimensional parameter c . Then, the spectral operator is defined via the functional calculus as a function of the infinitesimal shift. In this manner, it is viewed as a natural 'quantum' analog of the Riemann zeta function. More precisely, within this framework, the spectral operator is defined as the composite map of the Riemann zeta function with the infinitesimal shift, viewed as an unbounded normal operator acting on the above Hilbert space. It is shown that the quasi-invertibility of the

spectral operator is intimately connected to the existence of critical zeros of the Riemann zeta function, leading to a new spectral and operator-theoretic reformulation of the Riemann hypothesis. Accordingly, the spectral operator is quasi-invertible for all values of the dimensional parameter c in the critical interval $(0,1)$ (other than in the midfractal case when $c = 1/2$) if and only if the Riemann hypothesis (RH) is true. A related, but seemingly quite different, reformulation of RH, due to the second author and referred to as an 'asymmetric criterion for RH', is also discussed in some detail: namely, the spectral operator is invertible for all values of c in the left-critical interval $(0,1/2)$ if and only if RH is true. These spectral reformulations of RH also led to the discovery of several 'mathematical phase transitions' in this context, for the shape of the spectrum, the invertibility, the boundedness or the unboundedness of the spectral operator, and occurring either in the

midfractal case or in the most fractal case when the underlying fractal dimension is equal to $\frac{1}{2}$ or 1, respectively. In particular, the midfractal dimension $c=1/2$ is playing the role of a critical parameter in quantum statistical physics and the theory of phase transitions and critical phenomena. Furthermore, the authors provide a 'quantum analog' of Voronin's classical theorem about the universality of the Riemann zeta function. Moreover, they obtain and study quantized counterparts of the Dirichlet series and of the Euler product for the Riemann zeta function, which are shown to converge (in a suitable sense) even inside the critical strip. For pedagogical reasons, most of the book is devoted to the study of the quantized Riemann zeta function. However, the results obtained in this monograph are expected to lead to a quantization of most classic arithmetic zeta functions, hence, further 'naturally quantizing' various aspects of analytic number theory and

arithmetic geometry. The book should be accessible to experts and non-experts alike, including mathematics and physics graduate students and postdoctoral researchers, interested in fractal geometry, number theory, operator theory and functional analysis, differential equations, complex analysis, spectral theory, as well as mathematical and theoretical physics. Whenever necessary, suitable background about the different subjects involved is provided and the new work is placed in its proper historical context. Several appendices supplementing the main text are also included.

Series Associated With the Zeta and Related Functions - Hari M. Srivastava 2001

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).

Learning SciPy for Numerical and Scientific Computing - Second Edition - Sergio J. Rojas G. 2015-02-26

This book targets programmers and scientists who have basic Python knowledge and who are keen to perform scientific and numerical computations with SciPy.

In Pursuit of Zeta-3 - Paul J. Nahin 2021-10-19

"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"--

Zeta and L-Functions of Varieties and Motives -

Bruno Kahn 2020-04-30

The amount of mathematics invented for number-theoretic reasons is impressive. It includes much of complex analysis, the re-foundation of algebraic geometry on commutative algebra, group cohomology, homological algebra, and the theory of motives. Zeta and L-functions sit at the meeting point of all these theories and have played a profound role in shaping the evolution of number theory. This book presents a big picture of zeta and L-functions and the complex theories surrounding them, combining standard material with results and perspectives that are not made explicit elsewhere in the

literature. Particular attention is paid to the development of the ideas surrounding zeta and L-functions, using quotes from original sources and comments throughout the book, pointing the reader towards the relevant history. Based on an advanced course given at Jussieu in 2013, it is an ideal introduction for graduate students and researchers to this fascinating story.

[Exploring the Riemann Zeta Function](#) - Hugh Montgomery 2018-08-11

Exploring the Riemann Zeta Function: 190 years from Riemann's Birth presents a collection of chapters contributed by eminent experts devoted to the Riemann Zeta Function, its generalizations, and their various applications to several scientific disciplines, including Analytic Number Theory, Harmonic Analysis, Complex Analysis, Probability Theory, and related subjects. The book focuses on both old and new results towards the solution of long-standing problems as well as it features some key historical remarks.

The purpose of this volume is to present in a unified way broad and deep areas of research in a self-contained manner. It will be particularly useful for graduate courses and seminars as well as it will make an excellent reference tool for graduate students and researchers in Mathematics, Mathematical Physics, Engineering and Cryptography.

Abel's Theorem and the Allied Theory - Henry Frederick Baker 1897

Complex Analysis with Applications to Number Theory
- Tarlok Nath Shorey
2020-11-13

The book discusses major topics in complex analysis with applications to number theory. This book is intended as a text for graduate students of mathematics and undergraduate students of engineering, as well as to researchers in complex analysis and number theory. This theory is a prerequisite for the study of many areas of mathematics, including the theory of several finitely and

infinitely many complex variables, hyperbolic geometry, two and three manifolds and number theory. In addition to solved examples and problems, the book covers most of the topics of current interest, such as Cauchy theorems, Picard's theorems, Riemann-Zeta function, Dirichlet theorem, gamma function and harmonic functions.

Arithmetic Tales - Olivier Bordellès 2020-11-26

This textbook covers a wide array of topics in analytic and multiplicative number theory, suitable for graduate level courses. Extensively revised and extended, this Advanced Edition takes a deeper dive into the subject, with the elementary topics of the previous edition making way for a fuller treatment of more advanced topics. The core themes of the distribution of prime numbers, arithmetic functions, lattice points, exponential sums and number fields now contain many more details and additional topics. In addition to covering a range of classical and standard results,

some recent work on a variety of topics is discussed in the book, including arithmetic functions of several variables, bounded gaps between prime numbers à la Yitang Zhang, Mordell's method for exponential sums over finite fields, the resonance method for the Riemann zeta function, the Hooley divisor function, and many others. Throughout the book, the emphasis is on explicit results. Assuming only familiarity with elementary number theory and analysis at an undergraduate level, this textbook provides an accessible gateway to a rich and active area of number theory. With an abundance of new topics and 50% more exercises, all with solutions, it is now an even better guide for independent study.

Zeta and q-Zeta Functions and Associated Series and Integrals

- H. M. Srivastava 2011-10-11
 Zeta and q-Zeta Functions and Associated Series and Integrals is a thoroughly revised, enlarged and updated version of Series Associated with the Zeta and Related Functions.

Many of the chapters and sections of the book have been significantly modified or rewritten, and a new chapter on the theory and applications of the basic (or q-) extensions of various special functions is included. This book will be invaluable because it covers not only detailed and systematic presentations of the theory and applications of the various methods and techniques used in dealing with many different classes of series and integrals associated with the Zeta and related functions, but stimulating historical accounts of a large number of problems and well-classified tables of series and integrals. Detailed and systematic presentations of the theory and applications of the various methods and techniques used in dealing with many different classes of series and integrals associated with the Zeta and related functions
Multiple Zeta Functions, Multiple Polylogarithms and Their Special Values - Jianqiang Zhao 2016-03-07
 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 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 -Analog 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

The Riemann Zeta-Function

- Anatoly A. Karatsuba
1992-01-01

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.
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Lectures on the Riemann Zeta Function - H. Iwaniec
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The Riemann zeta function was introduced by L. Euler (1737) in connection with questions about the distribution of prime numbers. Later, B. Riemann (1859) derived deeper results about the prime numbers by considering the zeta function in the complex variable. The famous Riemann Hypothesis, asserting that all of the non-trivial zeros of zeta are on a critical line in the complex plane, is one of the most important unsolved problems in modern mathematics. The present book consists of two parts. The first part covers classical material about the zeros of the Riemann zeta function with applications to the distribution of prime numbers, including those made by Riemann himself, F. Carlson, and Hardy-Littlewood. The second part gives a complete presentation of Levinson's method for zeros on the critical line, which allows

one to prove, in particular, that more than one-third of non-trivial zeros of zeta are on the critical line. This approach and some results concerning

integrals of Dirichlet polynomials are new. There are also technical lemmas which can be useful in a broader context.