

Remarkable Mathematicians From Euler To Von Neumann Spectrum Series

"Leonhard Euler and the Bernoullis is a fascinating tale of the Bernoulli family and Euler's association with them. Successful merchants in the 16th and 17th centuries, the Bernoullis were driven out of Antwerp during the persecution of the Huguenots and settled first in Frankfurt, and then in Basel, where one of the most remarkable mathematical dy

"Dwight E. Neuenschwander's introduction to the theorem's genesis, applications, and consequences artfully unpacks its universal importance and unsurpassed elegance. Drawing from over thirty years of teaching the subject, Neuenschwander uses mechanics, optics, geometry, and field theory to point the way to a deep understanding of Noether's Theorem. The three sections provide a step-by-step, simple approach to the less-complex concepts surrounding the theorem, in turn instilling the knowledge and confidence needed to grasp the full wonder it encompasses. Illustrations and worked examples throughout each chapter serve as signposts on the way to this apex of physics."--Publisher's description.

Tracing the development of mathematics from a biographical standpoint, *Mathematics Frontiers: 1950 to the Present* profiles innovators from the second half of the 20th century who made significant discoveries in both pure and applied mathematics. From John H. Conway, who helped complete the classification of all finite groups (and invented The Game of Life board game), to Stephen Hawking, who established the mathematical basis for black holes, to Fan Chung, who developed an encoding and decoding algorithm for cell phone calls, this lively survey of contemporary minds behind the math is ideal for middle and high school students seeking resources for research or general interest.

In August 1859 Bernhard Riemann, a little-known 32-year old mathematician, presented a paper to the Berlin Academy titled: "On the Number of Prime Numbers Less Than a Given Quantity." In the middle of that paper, Riemann made an incidental remark â€" a guess, a hypothesis. What he tossed out to the assembled mathematicians that day has proven to be almost cruelly compelling to countless scholars in the ensuing years. Today, after 150 years of careful research and exhaustive study, the question remains. Is the hypothesis true or false? Riemann's basic inquiry, the primary topic of his paper, concerned a straightforward but nevertheless important matter of arithmetic â€" defining a precise formula to track and identify the occurrence of prime numbers. But it is that incidental remark â€" the Riemann Hypothesis â€" that is the truly astonishing legacy of his 1859 paper. Because Riemann was able to see beyond the pattern of the primes to discern traces of something mysterious and mathematically elegant shrouded in the shadows â€" subtle variations in the distribution of those prime numbers. Brilliant for its clarity, astounding for its potential consequences, the Hypothesis took on enormous importance in mathematics. Indeed, the successful solution to this puzzle would herald a revolution in prime number theory. Proving or disproving it became the greatest challenge of the age. It has become clear that the Riemann Hypothesis, whose resolution seems to hang tantalizingly just beyond our grasp, holds the key to a variety of scientific and mathematical investigations. The making and breaking of modern codes, which depend on the properties of the prime numbers, have roots in the Hypothesis. In a series of extraordinary developments during the 1970s, it emerged that even the physics of the atomic nucleus is connected in ways not yet fully understood to this strange conundrum. Hunting down the solution to the Riemann Hypothesis has become an obsession for many â€" the veritable "great white whale" of mathematical research. Yet despite determined efforts by generations of mathematicians, the Riemann Hypothesis defies resolution. Alternating passages of extraordinarily lucid mathematical exposition with chapters of elegantly composed biography and history, *Prime Obsession* is a fascinating and fluent account of an epic mathematical mystery that continues to challenge and excite the world. Posited a century and a half ago, the Riemann Hypothesis is an intellectual feast for the cognoscenti and the curious alike. Not just a story of numbers and calculations, *Prime Obsession* is the engrossing tale of a relentless hunt for an elusive proof â€" and those who have been consumed by it.

Ioan James introduces and profiles sixty mathematicians from the era when mathematics was freed from its classical origins to develop into its modern form. The subjects, all born between 1700 and 1910, come from a wide range of countries, and all made important contributions to mathematics, through their ideas, their teaching, and their influence. James emphasizes their varied life stories, not the details of their mathematical achievements. The book is organized chronologically into ten chapters, each of which contains biographical sketches of six mathematicians. The men and women James has chosen to portray are representative of the history of mathematics, such that their stories, when read in sequence, convey in human terms something of the way in which mathematics developed. Ioan James is a professor at the Mathematical Institute, University of Oxford. He is the author of *Topological Topics* (Cambridge, 1983), *Fibrewise Topology* (Cambridge, 1989), *Introduction to Uniform Spaces* (Cambridge, 1990), *Topological and Uniform Spaces* (Springer-Verlag New York, 1999), and co-author with Michael C. Crabb of *Fibrewise Homotopy Theory* (Springer-Verlag New York, 1998). James is the former editor of the London Mathematical Society Lecture Note Series and volume editor of numerous books. He is the organizer of the Oxford Series of Topology symposia and other conferences, and co-chairman of the Task Force for Mathematical Sciences of Campaign for Oxford.

In the mid-eighteenth century, Swiss-born mathematician Leonhard Euler developed a formula so innovative and complex that it continues to inspire research, discussion, and even the occasional limerick. Dr. Euler's Fabulous Formula shares the fascinating story of this groundbreaking formula—long regarded as the gold standard for mathematical beauty—and shows why it still lies at the heart of complex number theory. In some ways a sequel to Nahin's *An Imaginary Tale*, this book examines the many applications of complex numbers alongside intriguing stories from the history of mathematics. Dr. Euler's Fabulous Formula is accessible to any reader familiar with calculus and differential

equations, and promises to inspire mathematicians for years to come.

Like masterpieces of art, music, and literature, great mathematical theorems are creative milestones, works of genius destined to last forever. Now William Dunham gives them the attention they deserve. Dunham places each theorem within its historical context and explores the very human and often turbulent life of the creator -- from Archimedes, the absentminded theoretician whose absorption in his work often precluded eating or bathing, to Gerolamo Cardano, the sixteenth-century mathematician whose accomplishments flourished despite a bizarre array of misadventures, to the paranoid genius of modern times, Georg Cantor. He also provides step-by-step proofs for the theorems, each easily accessible to readers with no more than a knowledge of high school mathematics. A rare combination of the historical, biographical, and mathematical, *Journey Through Genius* is a fascinating introduction to a neglected field of human creativity. "It is mathematics presented as a series of works of art; a fascinating lingering over individual examples of ingenuity and insight. It is mathematics by lightning flash." --Isaac Asimov

An award-winning science writer introduces us to mathematics using the extraordinary equation that unites five of mathematics' most important numbers. Bertrand Russell wrote that mathematics can exalt "as surely as poetry." This is especially true of one equation: $e^{i\pi} + 1 = 0$, the brainchild of Leonhard Euler, the Mozart of mathematics. More than two centuries after Euler's death, it is still regarded as a conceptual diamond of unsurpassed beauty. Called Euler's identity or God's equation, it includes just five numbers but represents an astonishing revelation of hidden connections. It ties together everything from basic arithmetic to compound interest, the circumference of a circle, trigonometry, calculus, and even infinity. In David Stipp's hands, Euler's identity formula becomes a contemplative stroll through the glories of mathematics. The result is an ode to this magical field.

Remarkable Mathematicians From Euler to von Neumann Mathematical Association of America

Celebrating the 300th birthday of Leonhard Euler - collected articles address aspects of Euler's life and work.

Mathematics is often thought of as the coldest expression of pure reason. But few subjects provoke hotter emotions--and inspire more love and hatred--than mathematics. And although math is frequently idealized as floating above the messiness of human life, its story is nothing if not human; often, it is all too human. *Loving and Hating Mathematics* is about the hidden human, emotional, and social forces that shape mathematics and affect the experiences of students and mathematicians. Written in a lively, accessible style, and filled with gripping stories and anecdotes, *Loving and Hating Mathematics* brings home the intense pleasures and pains of mathematical life. These stories challenge many myths, including the notions that mathematics is a solitary pursuit and a "young man's game," the belief that mathematicians are emotionally different from other people, and even the idea that to be a great mathematician it helps to be a little bit crazy. Reuben Hersh and Vera John-Steiner tell stories of lives in math from their very beginnings through old age, including accounts of teaching and mentoring, friendships and rivalries, love affairs and marriages, and the experiences of women and minorities in a field that has traditionally been unfriendly to both. Included here are also stories of people for whom mathematics has been an immense solace during times of crisis, war, and even imprisonment--as well as of those rare individuals driven to insanity and even murder by an obsession with math. This is a book for anyone who wants to understand why the most rational of human endeavors is at the same time one of the most emotional.

During the first half of the 20th century, mathematics became an international discipline that led to major advances in science and technology. *Modern Mathematics: 1900 to 1950* provides an eye-opening introduction to those five historic decades by analyzing the advancement of the field through the accomplishments of 10 significant mathematicians. From David Hilbert and Emmy Noether, who introduced the infinite dimensional vector spaces and algebraic rings that bear their names, to Norbert Wiener, the founder of cybernetics, this in-depth volume is an excellent choice for libraries aiming to provide a range of resources covering the history of mathematics.

The interest earned on a bank account, the arrangement of seeds in a sunflower, and the shape of the Gateway Arch in St. Louis are all intimately connected with the mysterious number e . In this informal and engaging history, Eli Maor portrays the curious characters and the elegant mathematics that lie behind the number. Designed for a reader with only a modest mathematical background, this biography brings out the central importance of e to mathematics and illuminates a golden era in the age of science.

This entertaining book presents a collection of 180 famous mathematical puzzles and intriguing elementary problems that great mathematicians have posed, discussed, and/or solved. The selected problems do not require advanced mathematics, making this book accessible to a variety of readers. Mathematical recreations offer a rich playground for both amateur and professional mathematicians. Believing that creative stimuli and aesthetic considerations are closely related, great mathematicians from ancient times to the present have always taken an interest in puzzles and diversions. The goal of this book is to show that famous mathematicians have all communicated brilliant ideas, methodological approaches, and absolute genius in mathematical thoughts by using recreational mathematics as a framework. Concise biographies of many mathematicians mentioned in the text are also included. The majority of the mathematical problems presented in this book originated in number theory, graph theory, optimization, and probability. Others are based on combinatorial and chess problems, while still others are geometrical and arithmetical puzzles. This book is intended to be both entertaining as well as an introduction to various intriguing mathematical topics and ideas. Certainly, many stories and famous puzzles can be very useful to prepare classroom lectures, to inspire and amuse students, and to instill affection for mathematics.

Ideal for high school and college students studying history through the everyday lives of men and women, this book offers intriguing information about the jobs that people have

held, from ancient times to the 21st century. • Provides detailed, interesting essays describing more than 300 professions and occupations across a broad range of eras, including the 21st century, and from around the world, which will give readers a wider understanding of how people have supported themselves throughout time • Supplies historical primary documents that provide personal perspectives on past occupations • Offers fascinating information on how professions began, who did them, and continuity in occupations across time, such as that 18th-century journalists were often imprisoned for displeasing those in authority, and yet 21st-century U.S. journalists may still spend time in jail for refusing to reveal their sources

Excursions in Classical Analysis will introduce students to advanced problem solving and undergraduate research in two ways: it will provide a tour of classical analysis, showcasing a wide variety of problems that are placed in historical context, and it will help students gain mastery of mathematical discovery and proof. The [Author]; presents a variety of solutions for the problems in the book. Some solutions reach back to the work of mathematicians like Leonhard Euler while others connect to other beautiful parts of mathematics. Readers will frequently see problems solved by using an idea that, at first glance, might not even seem to apply to that problem. Other solutions employ a specific technique that can be used to solve many different kinds of problems. Excursions emphasizes the rich and elegant interplay between continuous and discrete mathematics by applying induction, recursion, and combinatorics to traditional problems in classical analysis. The book will be useful in students' preparations for mathematics competitions, in undergraduate reading courses and seminars, and in analysis courses as a supplement. The book is also ideal for self study, since the chapters are independent of one another and may be read in any order.

Publisher description

In just seven symbols, with profound and beautiful simplicity, Euler's Equation connects five of the most important numbers in mathematics. Robin Wilson explores each number in turn, then brings them together to consider the power of the equation as a whole.

Among the many constants that appear in mathematics, π , e , and i are the most familiar. Following closely behind is γ , or gamma, a constant that arises in many mathematical areas yet maintains a profound sense of mystery. In a tantalizing blend of history and mathematics, Julian Havil takes the reader on a journey through logarithms and the harmonic series, the two defining elements of gamma, toward the first account of gamma's place in mathematics. Introduced by the Swiss mathematician Leonhard Euler (1707-1783), who figures prominently in this book, gamma is defined as the limit of the sum of $1 + 1/2 + 1/3 + \dots + 1/n$, minus the natural logarithm of n --the numerical value being 0.5772156. . . . But unlike its more celebrated colleagues π and e , the exact nature of gamma remains a mystery--we don't even know if gamma can be expressed as a fraction. Among the numerous topics that arise during this historical odyssey into fundamental mathematical ideas are the Prime Number Theorem and the most important open problem in mathematics today--the Riemann Hypothesis (though no proof of either is offered!). Sure to be popular with not only students and instructors but all math aficionados, Gamma takes us through countries, centuries, lives, and works, unfolding along the way the stories of some remarkable mathematics from some remarkable mathematicians.

From 700 BCE to CE 1300, thousands of scholars from many different civilizations introduced mathematical ideas that established the foundations of arithmetic, number theory, algebra, geometry, and trigonometry, as well as the r .

Ioan James introduces and profiles sixty mathematicians from an era which saw mathematics freed from its classical origins to develop into its modern form. The characters, all born between 1700 and 1910, come from a wide range of countries, and all made an important contribution to mathematics, through their ideas, their teaching, their influence, and so on. The book is organised chronologically into ten chapters, each of which contains potted life stories of six mathematicians. The players James has chosen to portray are sufficiently representative that their stories, when read in sequence, convey in human terms something of the way in which mathematics developed.

Sandifer has been studying Euler for decades and is one of the world's leading experts on his work. This volume is the second collection of Sandifer's "How Euler Did It" columns. Each is a jewel of historical and mathematical exposition. The sum total of years of work and study of the most prolific mathematician of history, this volume will leave you marveling at Euler's clever inventiveness and Sandifer's wonderful ability to explicate and put it all in context.

This book primarily serves as a historical research monograph on the biographical sketch and career of Leonhard Euler and his major contributions to numerous areas in the mathematical and physical sciences. It contains fourteen chapters describing Euler's works on number theory, algebra, geometry, trigonometry, differential and integral calculus, analysis, infinite series and infinite products, ordinary and elliptic integrals and special functions, ordinary and partial differential equations, calculus of variations, graph theory and topology, mechanics and ballistic research, elasticity and fluid mechanics, physics and astronomy, probability and statistics. The book is written to provide a definitive impression of Euler's personal and professional life as well as of the range, power, and depth of his unique contributions. This tricentennial tribute commemorates Euler the great man and Euler the universal mathematician of all time. Based on the author's historically motivated method of teaching, special attention is given to demonstrate that Euler's work had served as the basis of research and developments of mathematical and physical sciences for the last 300 years. An attempt is also made to examine his research and its relation to current mathematics and science. Based on a series of Euler's extraordinary contributions, the historical development of many different subjects of mathematical sciences is traced with a linking commentary so that it puts the reader at the forefront of current research. Erratum. Sample Chapter(s). Chapter 1: Mathematics Before Leonhard Euler (434 KB). Contents: Mathematics Before Leonhard Euler; Brief Biographical Sketch and Career of Leonhard Euler; Euler's Contributions to Number Theory and Algebra; Euler's Contributions to Geometry and Spherical Trigonometry; Euler's Formula for Polyhedra, Topology and Graph Theory; Euler's Contributions to Calculus and Analysis; Euler's Contributions to the Infinite Series and the Zeta Function; Euler's Beta and Gamma Functions and Infinite Products; Euler and Differential Equations; The Euler Equations of Motion in Fluid Mechanics; Euler's Contributions to Mechanics and Elasticity; Euler's Work on the Probability Theory; Euler's Contributions to Ballistics; Euler and His Work on Astronomy and Physics. Readership: Undergraduate and graduate students of mathematics, mathematics education, physics, engineering and science. As well as professionals and prospective mathematical scientists.

In this accessible and illuminating study of how the science of mathematics developed, a veteran math researcher and educator looks at the ways in which our evolutionary makeup is both a help and a hindrance to the study of math. Artstein chronicles the discovery of important mathematical connections between mathematics and the real world from ancient times to the present. The author then describes some of the contemporary applications of mathematics—in probability theory, in the study of human behavior, and in combination with computers, which give mathematics unprecedented power. The author

concludes with an insightful discussion of why mathematics, for most people, is so frustrating. He argues that the rigorous logical structure of math goes against the grain of our predisposed ways of thinking as shaped by evolution, presumably because the talent needed to cope with logical mathematics gave the human race as a whole no evolutionary advantage. With this in mind, he offers ways to overcome these innate impediments in the teaching of math.

Among the myriad of constants that appear in mathematics, π , e , and i are the most familiar. Following closely behind is γ , or gamma, a constant that arises in many mathematical areas yet maintains a profound sense of mystery. In a tantalizing blend of history and mathematics, Julian Havil takes the reader on a journey through logarithms and the harmonic series, the two defining elements of gamma, toward the first account of gamma's place in mathematics. Introduced by the Swiss mathematician Leonhard Euler (1707-1783), who figures prominently in this book, gamma is defined as the limit of the sum of $1 + 1/2 + 1/3 + \dots$ up to $1/n$, minus the natural logarithm of n --the numerical value being 0.5772156. . . . But unlike its more celebrated colleagues π and e , the exact nature of gamma remains a mystery--we don't even know if gamma can be expressed as a fraction. Among the numerous topics that arise during this historical odyssey into fundamental mathematical ideas are the Prime Number Theorem and the most important open problem in mathematics today--the Riemann Hypothesis (though no proof of either is offered!). Sure to be popular with not only students and instructors but all math aficionados, Gamma takes us through countries, centuries, lives, and works, unfolding along the way the stories of some remarkable mathematics from some remarkable mathematicians.

Recipient of the Mathematical Association of America's Beckenbach Book Prize in 2008! Leonhard Euler was one of the most prolific mathematicians that have ever lived. This book examines the huge scope of mathematical areas explored and developed by Euler, which includes number theory, combinatorics, geometry, complex variables and many more. The information known to Euler over 300 years ago is discussed, and many of his advances are reconstructed. Readers will be left in no doubt about the brilliance and pervasive influence of Euler's work.

The Early Mathematics of Leonhard Euler gives an article-by-article description of Leonhard Euler's early mathematical works; the 50 or so mathematical articles he wrote before he left St. Petersburg in 1741 to join the Academy of Frederick the Great in Berlin. These early pieces contain some of Euler's greatest work, the Königsberg bridge problem, his solution to the Basel problem, and his first proof of the Euler-Fermat theorem. It also presents important results that we seldom realize are due to Euler; that mixed partial derivatives are (usually) equal, our $f(x)$ notation, and the integrating factor in differential equations. The book shows how contributions in diverse fields are related, how number theory relates to series, which, in turn, relate to elliptic integrals and then to differential equations. There are dozens of such strands in this beautiful web of mathematics. At the same time, we see Euler grow in power and sophistication, from a young student when at 18 he published his first work on differential equations (a paper with a serious flaw) to the most celebrated mathematician and scientist of his time. It is a portrait of the world's most exciting mathematics between 1725 and 1741, rich in technical detail, woven with connections within Euler's work and with the work of other mathematicians in other times and places, laced with historical context.

This collection of essays explores the ancient affinity between the mathematical and the aesthetic, focusing on fundamental connections between these two modes of reasoning and communicating. From historical, philosophical and psychological perspectives, with particular attention to certain mathematical areas such as geometry and analysis, the authors examine ways in which the aesthetic is ever-present in mathematical thinking and contributes to the growth and value of mathematical knowledge.

The positive response to the publication of Blanton's English translations of Euler's "Introduction to Analysis of the Infinite" confirmed the relevance of this 240 year old work and encouraged Blanton to translate Euler's "Foundations of Differential Calculus" as well. The current book constitutes just the first 9 out of 27 chapters. The remaining chapters will be published at a later time. With this new translation, Euler's thoughts will not only be more accessible but more widely enjoyed by the mathematical community.

Topology occupies a central position in modern mathematics, and the concept of the fibre bundle provides an appropriate framework for studying differential geometry. Fibrewise homotopy theory is a very large subject that has attracted a good deal of research in recent years. This book provides an overview of the subject as it stands at present.

This book comprises five parts. The first three contain ten historical essays on important topics: number theory, calculus/analysis, and proof, respectively. Part four deals with several historically oriented courses, and Part five provides biographies of five mathematicians who played major roles in the historical events described in the first four parts of the work. Excursions in the History of Mathematics was written with several goals in mind: to arouse mathematics teachers' interest in the history of their subject; to encourage mathematics teachers with at least some knowledge of the history of mathematics to offer courses with a strong historical component; and to provide an historical perspective on a number of basic topics taught in mathematics courses.

This book expands the landscape of research in mathematics education by analyzing how the body influences mathematical thinking.

How a simple equation reshaped mathematics Leonhard Euler's polyhedron formula describes the structure of many objects—from soccer balls and gemstones to Buckminster Fuller's buildings and giant all-carbon molecules. Yet Euler's theorem is so simple it can be explained to a child. From ancient Greek geometry to today's cutting-edge research, Euler's Gem celebrates the discovery of Euler's beloved polyhedron formula and its far-reaching impact on topology, the study of shapes. Using wonderful examples and numerous illustrations, David Richeson presents this mathematical idea's many elegant and unexpected applications, such as showing why there is always some windless spot on earth, how to measure the acreage of a tree farm by counting trees, and how many crayons are needed to color any map. Filled with a who's who of brilliant mathematicians who questioned, refined, and contributed to a remarkable theorem's development, Euler's Gem will fascinate every mathematics enthusiast. This paperback edition contains a new preface by the author.

An acclaimed biography of the Enlightenment's greatest mathematician This is the first full-scale biography of Leonhard Euler (1707–1783), one of the greatest mathematicians and theoretical physicists of all time. In this comprehensive and authoritative account, Ronald Calinger connects the story of Euler's eventful life to the astonishing achievements that place him in the company of Archimedes, Newton, and Gauss. Drawing on Euler's massive published works and correspondence, this biography sets Euler's work in its multilayered context—personal, intellectual, institutional, political, cultural, religious, and social. It is a story of nearly incessant accomplishment, from Euler's fundamental contributions to almost every area of pure and applied mathematics in his time—especially calculus, mechanics, and optics—to his advances in shipbuilding, telescopes, acoustics, ballistics, cartography, chronology, and music theory.

The primary aim of this book is to provide teachers of mathematics with all the tools they would need to conduct most effective mathematics instruction. The book guides teachers through the all-important planning process, which includes short and long-term planning as well as constructing most effective lessons, with an emphasis on motivation, classroom management, emphasizing problem-solving techniques, assessment, enriching instruction for students at all levels, and introducing relevant extracurricular mathematics activities. Technology applications are woven throughout the text. A unique feature of this book is the second half, which provides 125 highly motivating enrichment units for all levels of secondary school mathematics. Many years of proven success makes this book essential for both pre-service and in-service mathematics teachers.

Engineering transformed the world completely between the 17th and 21st centuries. Remarkable Engineers tells the stories of 51 of the key pioneers in this transformation, from the designers and builders of the world's railways, bridges and aeroplanes, to the founders of the modern electronics and communications revolutions. The focus throughout is on their varied life stories, and engineering and scientific detail is kept to a minimum. Engineer profiles are organized chronologically, inviting readers with an interest in engineering to follow the path by which these remarkable engineers utterly changed our lives.

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