Gamma Exploring Eulers Constant Julian Havil

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Gamma Exploring Eulers Constant Julian
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Julian Havil
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"Among the many constants that appear in mathematics, [pi], e, and i are the most familiar. Following closely behind is [gamma] or gamma, a constant that arises in many mathematical areas yet remains profoundly mysterious. 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 + ... up to 1/n , minus the natural logarithm of n -- and the numerical value is 0.5772156 ... But unlike its more celebrated colleagues [pi] and e, the exact nature of gamma remains a mystery. In fact, we don't even know if gamma is a fraction. In this tantalizing blend of history and mathematics, Julian Havil takes readers 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. 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."--Back cover.

Among the myriad of constants that appear in mathematics, p, e, and i are the most familiar. Following closely behind is g, 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 + . . . up to 1/n, minus the natural logarithm of n--the numerical value being 0.5772156. . .. But unlike its more celebrated colleagues p 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.

Math—the application of reasonable logic to reasonable assumptions—usually produces reasonable results. But sometimes math generates astonishing paradoxes—conclusions that seem completely unreasonable or just plain impossible but that are nevertheless demonstrably true. Did you know that a losing sports team can become a winning one by adding worse players than its opponents? Or that the thirteenth of the month is more likely to be a Friday than any other day? Or that cones can roll unaided uphill? In Nonplussed!—a delightfully eclectic collection of paradoxes from many different areas of math—popular-math writer Julian Havil reveals the math that shows the truth of these and many other unbelievable ideas. Nonplussed! pays special attention to problems from probability and statistics, areas where intuition can easily be wrong. These problems include the vagaries of tennis scoring, what can be deduced from tossing a needle, and disadvantageous games that form winning combinations. Other chapters address everything from the historically important Torricelli's Trumpet to the mind-warping implications of objects that live on high dimensions. Readers learn about the colorful history and people associated with many of these problems in addition to their mathematical proofs. Nonplussed! will appeal to anyone with a calculus background who enjoys popular math books or puzzles.

Ten amazing curves personally selected by one of today's most important math writers Curves for the Mathematically Curious is a thoughtfully curated collection of ten mathematical curves, selected by Julian Havil for their significance, mathematical interest, and beauty. Each chapter gives an account of the history and definition of one curve, providing a glimpse into the elegant and often surprising mathematics involved in its creation and evolution. In telling the ten stories, Havil introduces many mathematicians and other innovators, some whose fame has withstood the passing of years and others who have slipped into comparative obscurity. You will meet Pierre Bézier, who is known for his ubiquitous and eponymous curves, and Adolphe Quetelet, who trumpeted the ubiquity of the normal curve but whose name now hides behind the modern body mass index. These and other ingenious thinkers engaged with the challenges, incongruities, and insights to be found in these remarkable curves—and now you can share in this adventure. Curves for the Mathematically Curious is a rigorous and enriching mathematical experience for anyone interested in curves, and the book is designed so that readers who choose can follow the details with pencil and paper. Every curve has a story worth telling.

The most comprehensive account of the mathematician's life and work John Napier (1550–1617) is celebrated today as the man who invented logarithms—an enormous intellectual achievement that would soon lead to the development of their mechanical equivalent in the slide rule: the two would serve humanity as the principal means of calculation until the mid-1970s. Yet, despite Napier's pioneering efforts, his life and work have not attracted detailed modern scrutiny. John Napier is the first contemporary biography to take an in-depth look at the multiple facets of Napier's story: his privileged position as the eighth Laird of Merchiston and the son of influential Scottish landowners; his reputation as a magician who dabbled in alchemy; his interest in agriculture; his involvement with a notorious outlaw; his staunch anti-Catholic beliefs; his interactions with such peers as Henry Briggs, Johannes Kepler, and Tycho Brahe; and, most notably, his estimable mathematical legacy. Julian Havil explores Napier's original development of logarithms, the motivations for his approach, and the reasons behind certain adjustments to them. Napier's inventive mathematical ideas also include formulas for solving spherical triangles, "Napier's Bones" (a more basic but extremely popular alternative device for calculation), and the use of decimal notation for fractions and binary arithmetic. Havil also considers Napier's study of the Book of Revelation, which led to his prediction of the Apocalypse in his first book, A Plaine Discovery of the Whole Revelation of St. John—the work for which Napier believed he would be most remembered. John Napier assesses one man's life and the lasting influence of his advancements on the mathematical sciences and beyond.

How does mathematics enable us to send pictures from space back to Earth? Where does the bell-shaped curve come from? Why do you need only 23 people in a room for a 50/50 chance of two of them sharing the same birthday? In Strange Curves, Counting Rabbits, and Other Mathematical Explorations, Keith Ball highlights how ideas, mostly from pure math, can answer these questions and many more. Drawing on areas of mathematics from probability theory, number theory, and geometry, he explores a wide range of concepts, some more light-hearted, others central to the development of the field and used daily by mathematicians, physicists, and engineers. Each of the book's ten chapters begins by outlining key concepts and goes on to discuss, with the minimum of technical detail, the principles that underlie them. Each includes puzzles and problems of varying difficulty. While the chapters are self-contained, they also reveal the links between seemingly unrelated topics. For example, the problem of how to design codes for satellite communication gives rise to the same idea of uncertainty as the problem of screening blood samples for disease. Accessible to anyone familiar with basic calculus, this book is a treasure trove of ideas that will entertain, amuse, and bemuse students, teachers, and math lovers of all ages.

The ancient Greeks discovered them, but it wasn't until the nineteenth century that irrational numbers were properly understood and rigorously defined, and even today not all their mysteries have been revealed. InThe Irrationals, the first popular and comprehensive book on the subject, Julian Havil tells the story of irrational numbers and the mathematicians who have tackled their challenges, from antiquity to the twenty-first century. Along the way, he explains why irrational numbers are surprisingly difficult to define--and why so many questions still surround them. Fascinating and illuminating, this is a book for everyone who loves math and the history behind it.

This brief monograph on the gamma function was designed by the author to fill what he perceived as a gap in the literature of mathematics, which often treated the gamma function in a manner he described as both sketchy and overly complicated. Author Emil Artin, one of the twentieth century's leading mathematicians, wrote in his Preface to this book, "I feel that this monograph will help to show that the gamma function can be thought of as one of the elementary functions, and that all of its basic properties can be established using elementary methods of the calculus." Generations of teachers and students have benefitted from Artin's masterly arguments and precise results. Suitable for advanced undergraduates and graduate students of mathematics, his treatment examines functions, the Euler integrals and the Gauss formula, large values of x and the multiplication formula, the connection with sin x, applications to definite integrals, and other subjects.

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.