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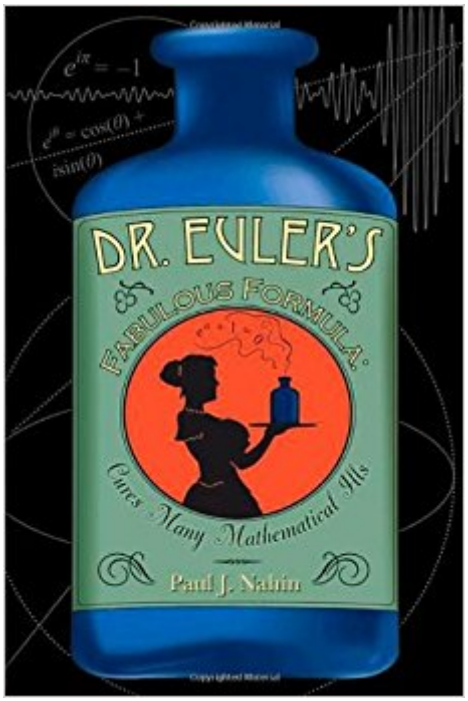
Dr. Euler's Fabulous Formula: Cures Many Mathematical Ills



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Synopsis

I used to think math was no fun'Cause I couldn't see how it was doneNow Euler's my heroFor I now see why zeroEquals e[pi] i+1--Paul Nahin, electrical engineer 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. This book is the sequel to Paul Nahin's An Imaginary Tale: The Story of I [the square root of -1], which chronicled the events leading up to the discovery of one of mathematics' most elusive numbers, the square root of minus one. Unlike the earlier book, which devoted a significant amount of space to the historical development of complex numbers, Dr. Euler begins with discussions of many sophisticated applications of complex numbers in pure and applied mathematics, and to electronic technology. The topics covered span a huge range, from a never-before-told tale of an encounter between the famous mathematician G. H. Hardy and the physicist Arthur Schuster, to a discussion of the theoretical basis for single-sideband AM radio, to the design of chase-and-escape problems. The book is accessible to any reader with the equivalent of the first two years of college mathematics (calculus and differential equations), and it promises to inspire new applications for years to come. Or as Nahin writes in the book's preface: To mathematicians ten thousand years hence, "Euler's formula will still be beautiful and stunning and untarnished by time."

Book Information

Paperback: 416 pages

Publisher: Princeton University Press; With a New preface by the author edition (May 15, 2011)

Language: English

ISBN-10: 0691150370

ISBN-13: 978-0691150376

Product Dimensions: 6.1 x 1.1 x 9.2 inches

Shipping Weight: 1.3 pounds (View shipping rates and policies)

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Customer Reviews

The reviews of An Imaginary Tale capture much of what will be said of Dr. Euler's Fabulous Formula. I happen to like Paul Nahin's books very much ever since reading The Science of Radio, one of my favorite books of all time. If you didn't like Imaginary, you won't like Dr. Euler's . If you like the earlier book, this one is a must.Chapter One starts with an introduction to complex numbers. This would make nice supplemental material for an introduction to complex numbers. The chapter is not the standard treatment. It gives a very clear introduction to Gauss' proof of the construction of the regular heptadecagon . The chapter goes on to factoring complex numbers in the context of Fermat's last theorem, with a very clear discussion of Lame's proof for n=7 . Earlier in the chapter Nahin uses the Cayley-Hamilton theorem to get De Moivre's theorem in matrix form without any mention of physical rotations.Fourier series and integrals comprise most of the book which ends with applications to single side band radio. This last topic is a nice inclusion for folks like me who liked Nahin's early book The Science of Radio. There is a story about G.H. Hardy and Arthur Schuster, that I had never seen elsewhere.I would recommend this book to anyone who likes undergraduate calculus and has some exposure to linear algebra, maybe a second or third year undergraduate. The material is idiosyncratic enough to be entertaining for anyone who has had courses in complex analysis and number theory. It is a good introduction and supplemental reading for such courses, but not as a primary text.

Here is a book that is a delight to read. It is well-written and the text flows marvelously between each page and around the many formulas that are so carefully presented and worked out. I rate this book as 5-stars for presenting ever more mathematics relating to complex numbers in a clear and detailed manner.The book is, as the author notes, a continuation of his book, An Imaginary Tale, where Nahin discusses the square root of -1. (If you haven't read that book, read it first because many of the footnotes refer to it.) In this book, we see more of complex numbers and, in particular, we see many applications of Euler's Identity that "e^ = cos(theta)+ i sin(theta)." This simple looking indentity is rich in applications and explorations. Nahin takes you on a journey to these topics and does so in an easy to follow way.There are interesting stories as you go such as the one where we find the Gibbs did not, contrary to almost all textbooks, discover what is call Gibbs Phenomena. There are other stories and anecdotes but I'll let you enjoy them on your own.That said, I must also say that the book assumes you have a good understanding of complex numbers and are comfortable manipulating them. A solid undergraduate understanding is all that's needed and if you have done graduate work, all the better. If you're considering the book at all, and have the math background, read it.If you don't know anything about complex numbers, well, this book may not be

as good as it could be for you.

Like all of Paul Nahin’s books, I really like this one. However, as with so many books an Errata would help. Mathematical and mathematical finance books are getting so expensive, that unless authors or publishers have a URL for Errata, readers esp. of mathematical books will wait for [sometimes years] for a second corrected edition of books. I could be wrong about these but it seems these are typos:p. 30 lines 5 & 6 curly bracket should only be around the 2 * cos(x/2) termp. 121 second equation should be t=(v+u)/(2*c)p. 121 ’* (1/(2*c)’ missing at end of the linep. 123 line 17, first word should be ’bother’ not ’other’p. 127 line 3 and 4, it seems that the ’icnPI/I’ [not the ones in the cos() or sin() terms] term after the ’B’ and before the ’2*cos’ respectively, should not be there. Or am I missing something ?p. 128 4th line from bottom should be 1753 not 1733p. 143 2nd line before last equation should be ’... (x- i * y)...’p. 144 equation under ’In summary, then...’ cases are reversedp. 216 seems 1/(2*PI) is missing from right side of first equation, i.e. from "...G(u)G(omega-u)...du"

Paul Nahin’s book, "Dr. Euler’s Fabulous Formula," is an excellent expository treatment of Euler’s formula (you say, "which one?") e^i*theta = cos(theta) + i*sin(theta) and its profound, and far-reaching, ramifications. Dr. Nahin also gives an extensive informal discussion of Fourier series, Fourier transforms, the Dirac Delta Function, and what electrical engineers would call "signals and systems theory." Some mathematical purists may criticize the lack of pure rigor. However, this book is an "expository" book, not a rigorous "textbook." Ideally, I recommend that you read Dr. Nahin’s book in conjunction with your standard college textbook. That way, you will get the best of both worlds. Your textbook will give you the disciplined rigor. Dr. Nahin’s book will give you the "Aha... insight!" I read Dr. Nahin’s book before taking a graduate level course in electrical engineering (EE) Signals and Systems. I breezed through the EE course with perfect scores on my exams, and I give a lot of credit to Dr. Nahin. When you study mathematics, you really need BOTH disciplined mathematical rigor AND intuitive insight and understanding. Beware, however, that this book has LOTS of mathematics in it. The book is loaded with serious mathematics. Don’t read this book if you want something for the intelligent layperson. Read this book if you love mathematics, if you are an engineering or mathematics student, or if you like industrial-strength mathematics. Paul Nahin may single-handedly save Americans from mathematical illiteracy. He does something that the mathematical community does not do well... "market and sell" mathematics.

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