Mathematics
2015

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"One of the finest scientific biographies ever written."
—Jim Holt, *New Yorker*

New
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Douglas Hofstadter and
a new preface by the author
Alan Turing: The Enigma
The Book That Inspired the Film *The Imitation Game*
Andrew Hodges

"One of the finest scientific biographies I've ever read: authoritative, superbly researched, deeply sympathetic, and beautifully told."
—Sylvia Nasar, author of *A Beautiful Mind*

It is only a slight exaggeration to say that the British mathematician Alan Turing (1912–54) saved the Allies from the Nazis, invented the computer and artificial intelligence, and anticipated gay liberation by decades—all before his suicide at age forty-one. This acclaimed biography of the founder of computer science, with a new preface by the author that addresses Turing's royal pardon in 2013, is the definitive account of an extraordinary mind and life.

The inspiration for a major motion picture starring Benedict Cumberbatch and Keira Knightley, *Alan Turing: The Enigma* is a gripping story of mathematics, computers, cryptography, and homosexual persecution.
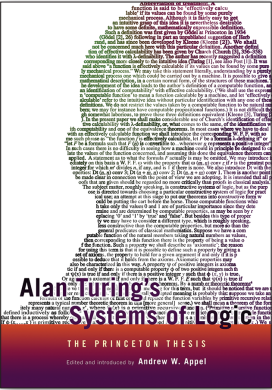
Alan Turing's Systems of Logic
The Princeton Thesis
Edited and introduced by Andrew W. Appel

Between inventing the concept of a universal computer in 1936 and breaking the German Enigma code during World War II, Alan Turing (1912–54), the British founder of computer science and artificial intelligence, came to Princeton University to study mathematical logic. Some of the greatest logicians in the world—including Alonzo Church, Kurt Gödel, John von Neumann, and Stephen Kleene—were at Princeton in the 1930s, and they were working on ideas that would lay the groundwork for what would become known as computer science. This book presents a facsimile of the original typescript of Turing's fascinating and influential 1938 Princeton PhD thesis, one of the key documents in the history of mathematics and computer science. The book also features essays by Andrew Appel and Solomon Feferman that explain the still-unfolding significance of the ideas Turing developed at Princeton.
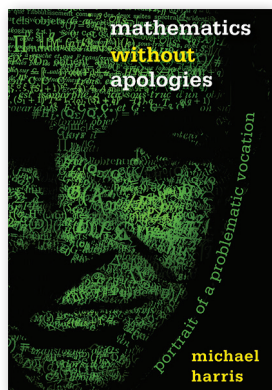
"For me, this is the most interesting of Alan Turing's writings, and it is a real delight to see a facsimile of the original typescript here."
—Barry Cooper, University of Leeds

Mathematics without Apologies
Portrait of a Problematic Vocation
Michael Harris

"In this lively book, Harris examines the mathematician's craft from every angle, from the elementary and familiar to the sophisticated and exotic, and questions the ethics of using mathematics in finance. *Mathematics without Apologies* is a very personal book dealing with timeless questions."
—Ivar Ekeland, author of *The Best of All Possible Worlds*

What do pure mathematicians do, and why do they do it? Looking beyond the conventional answers—for the sake of truth, beauty, and practical applications—this book offers an eclectic panorama of the lives and values and hopes and fears of mathematicians in the twenty-first century, assembling material from a startlingly diverse assortment of scholarly, journalistic, and pop culture sources.
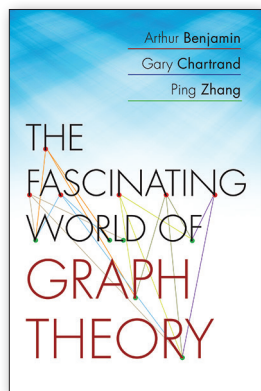
Disarmingly candid, relentlessly intelligent, and richly entertaining, *Mathematics without Apologies* takes readers on an unapologetic guided tour of the mathematical life, from the philosophy and sociology of mathematics to its reflections in film and popular music, with detours through the mathematical and mystical traditions of Russia, India, medieval Islam, the Bronx, and beyond.

"*Mathematics without Apologies* is a math book like no other. Harris mixes number theory, literary criticism, and philosophy into a powerful meditation on mathematics as it is really practiced, vaporizing all clichés and romantic myths within his astoundingly broad reach."
—Jordan Ellenberg, author of *How Not to Be Wrong: The Power of Mathematical Thinking*

The Fascinating World of Graph Theory
Arthur Benjamin, Gary Chartrand & Ping Zhang

"In this attractive introduction to the world of graphs, the authors entice and enthuse readers through a number of fun problems which present various aspects of the subject. Many of these problems are familiar—the four-color problem, the Königsberg Bridge problem, and 'instant insanity'—while others are less well known or of a more serious nature. This book can be used in different ways—as an entertaining book on recreational mathematics or as an accessible textbook on graph theory. I warmly recommend it."
—Robin J. Wilson, author of *Introduction to Graph Theory*

The fascinating world of graph theory goes back several centuries and revolves around the study of graphs—mathematical structures showing relations between objects. With applications in biology, computer science, transportation science, and other areas, graph theory encompasses some of the most beautiful formulas in mathematics—and some of its most famous problems.
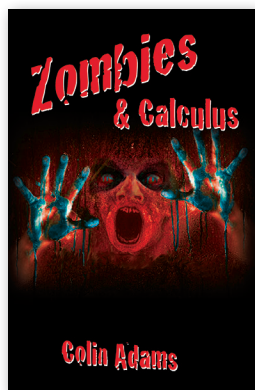
"This is a beautiful introduction to graph theory! It is filled with fun material, clear explanations, and a nice collection of exercises. A great book."
—William J. Cook, author of *In Pursuit of the Traveling Salesman*

New

Zombies and Calculus
Colin Adams

"Before *Zombies and Calculus*, math was quick to kill my appetite. In fact, math damn near killed me altogether throughout most of college (it is of course a cliché to say that as a math student I was pretty much a zombie). If I had only had this book then … at least now I can stomach derivatives as well as a zombie outbreak. That's no small accomplishment! Read *Zombies and Calculus*—you'll laugh . . . you'll cry . . . you'll multiply."
—Steven C. Schlozman, MD, author of *The Zombie Autopsies*

How can calculus help you survive the zombie apocalypse? Colin Adams, humor columnist for the *Mathematical Intelligencer* and one of today's most outlandish and entertaining popular math writers, demonstrates how in this zombie adventure novel.

Zombies and Calculus is the account of Craig Williams, a math professor at a small liberal arts college in New England, who, in the middle of a calculus class, finds himself suddenly confronted by a late-arriving student whose hunger is not for knowledge. A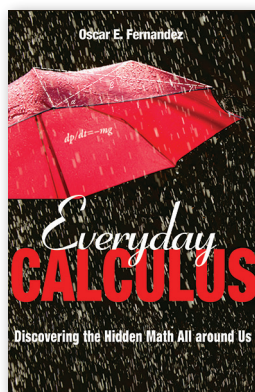s the zombie virus spreads and civilization crumbles, Williams uses calculus to help his small band of survivors defeat the hordes of the undead. Along the way, readers learn how to avoid being eaten by taking advantage of the fact that zombies always point their tangent vector toward their target, and how to use exponential growth to determine the rate at which the virus is spreading. Williams also covers topics such as logistic growth, gravitational acceleration, predator-prey models, pursuit problems, the physics of combat, and more. With the aid of his story, you too can survive the zombie onslaught.

Featuring easy-to-use appendixes that explain the mathematics necessary to enjoy the book, *Zombies and Calculus* is suitable for recent converts to calculus as well as more advanced readers familiar with multivariable calculus.

New

Everyday Calculus
Discovering the Hidden Math All around Us
Oscar E. Fernandez

"The author earnestly and excitedly seeks to make the principles of calculus near and natural, without the intimidation of a five-pound textbook dense with equations."
—Tom Schulte, *MAA Reviews*

"Fernandez's witty, delightful approach makes for a winning introduction to the wonderland of math behind the scenes of everyday life."
—*Publishers Weekly* (starred review)

Calculus. For some of us, the word conjures up memories of ten-pound textbooks and visions of tedious abstract equations. And yet, in reality, calculus is fun, accessible, and surrounds us everywhere we go. In *Everyday Calculus*, Oscar Fernandez shows us how to see the math in our coffee, on the highway, and even in the night sky.
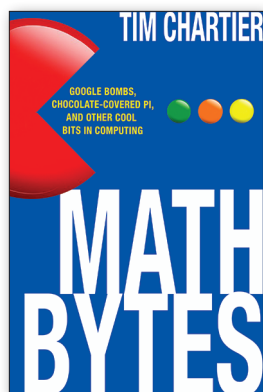
"For readers who love math, computing and puzzles, *Math Bytes* will be a welcome gift."
—George Erdosh, *San Francisco Book Review*

Math Bytes
Google Bombs, Chocolate-Covered Pi, and Other Cool Bits in Computing
Tim Chartier

"[A] delightful book of recreational mathematics. His presentation of a large array of topics is accompanied by excellent graphics, many in color.… In sum, a fun book."
—Philip J. Davis, *SIAM News*

This book provides a fun, hands-on approach to learning how mathematics and computing relate to the world around us and help us to better understand it. How can reposting on Twitter kill a movie's opening weekend? How can you use mathematics to find your celebrity look-alike? What is Homer Simpson's method for disproving Fermat's Last Theorem? Each topic in this refreshingly inviting book illustrates a famous mathematical algorithm or result—such as Google's PageRank and the traveling salesman problem—and the applications grow more challenging as you progress through the chapters. But don't worry, helpful solutions are provided each step of the way.
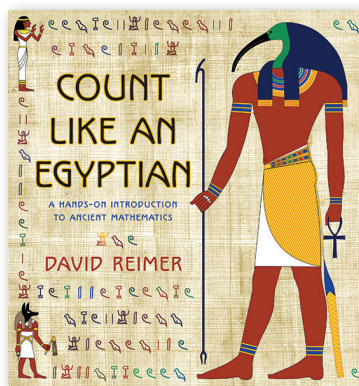
"*Count Like an Egyptian* is a beautifully illustrated and well-written book.… Reimer's overriding goal is to demonstrate that Egyptian fraction arithmetic is fascinating, versatile, and well suited for whatever calls fractions into existence."
—Calvin Jongsma, *MAA Reviews*

Count Like an Egyptian
A Hands-on Introduction to Ancient Mathematics
David Reimer

"Reimer gives us a detailed introduction to the mathematics of the ancient Egyptians—from their arithmetic operations to their truncated pyramids—in a beautifully designed volume that is so much easier to read than a papyrus scroll."
—William Dunham, author of *The Calculus Gallery: Masterpieces from Newton to Lebesgue*

The mathematics of ancient Egypt was fundamentally different from our math today. Contrary to what people might think, it wasn't a primitive forerunner of modern mathematics. In fact, it can't be understood using our current computational methods. *Count Like an Egyptian* provides a fun, hands-on introduction to the intuitive and often-surprising art of ancient Egyptian math. David Reimer guides you step-by-step through addition, subtraction, multiplication, and more. He even shows you how fractions and decimals may have been calculated—they technically didn't exist in the land of the pharaohs. You'll be counting like an Egyptian in no time, and along the way you'll learn firsthand how mathematics is an expression of the culture that uses it, and why there's more to math than rote memorization and bewildering abstraction.

Forthcoming
**Single Digits**
In Praise of Small Numbers
Marc Chamberland

"A veritable potpourri of mathematical factoids, *Single Digits* will provide you with conversational ammunition for all manner of nerdy gatherings."
—Henry Reich, creator of *MinutePhysics* and *MinuteEarth*

The numbers one through nine have remarkable mathematical properties and characteristics. For instance, why do eight perfect card shuffles leave a standard deck of cards unchanged? Are there really "six degrees of separation" between all pairs of people? And how can any map need only four colors to ensure that no regions of the same color touch? In *Single Digits*, Marc Chamberland takes readers on a fascinating exploration of small numbers, from one to nine, looking at their history, applications, and connections to various areas of mathematics, including number theory, geometry, chaos theory, numerical analysis, and mathematical physics.

Appealing to high school and college students, professional mathematicians, and those mesmerized by patterns, this book shows that single digits offer a plethora of possibilities that readers can count on.

June 2015. 216 pages. 24 halftones. 93 line illus. 20 tables.
Cl: 978-0-691-16114-3 $26.95 | £18.95
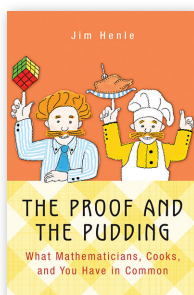
Forthcoming
The Proof and the Pudding
What Mathematicians, Cooks, and You Have in Common
Jim Henle

"Henle has written an enjoyable book that does an excellent job of relating mathematics to something we all do every day. Part cookbook and part popular-math book, *The Proof and the Pudding* is well-written, insightful, and enlightening."
—Oscar E. Fernandez, author of *Everyday Calculus: Discovering the Hidden Math All around Us*

Tie on your apron and step into Jim Henle's kitchen as he demonstrates how two equally savory pursuits—cooking and mathematics—have more in common than you realize. A tasty dish for gourmets of popular math, *The Proof and the Pudding* offers a witty and flavorful blend of mathematical treats and gastronomic delights that reveal how life in the mathematical world is tantalizingly similar to life in the kitchen.

May 2015. 184 pages. 229 duotones.
Cl: 978-0-691-16486-1 $26.95 | £18.95

To receive notices about new books, subscribe for email at: *press.princeton.edu/subscribe*
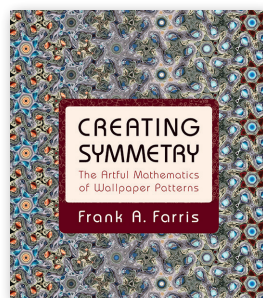
Forthcoming
Creating Symmetry
The Artful Mathematics of Wallpaper Patterns
Frank A. Farris

"In *Creating Symmetry*, Farris explores the concept of symmetry and its application to creating artistic patterns in two dimensions. The result is a set of algorithmic tools for transforming ordinary photographs into rosettes and wavelike murals decorated with colorful swirls and gradients. It is difficult to imagine a more engaging focus for teaching the mathematics of symmetry."
—Kenneth Libbrecht, author of *The Secret Life of a Snowflake: An Up-Close Look at the Art and Science of Snowflakes*

This lavishly illustrated book provides a hands-on, step-by-step introduction to the intriguing mathematics of symmetry. Instead of breaking up patterns into blocks—a sort of potato-stamp method—Frank Farris offers a completely new waveform approach that enables you to create an endless variety of rosettes, friezes, and wallpaper patterns: dazzling art images where the beauty of nature meets the precision of mathematics.

Fun, accessible, and challenging, *Creating Symmetry* features numerous examples and exercises throughout, as well as engaging discussions of the history behind the mathematics presented in the book.

July 2015. 256 pages. 103 color illus.
Cl: 978-0-691-16173-0 $35.00 | £24.95
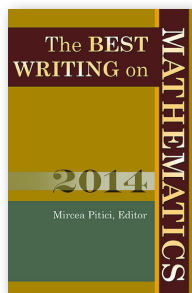
New
The Best Writing on Mathematics 2014
Edited by Mircea Pitici

This annual anthology brings together the year's finest mathematics writing from around the world. Featuring promising new voices alongside some of the foremost names in the field, *The Best Writing on Mathematics 2014* makes available to a wide audience many articles not easily found anywhere else—and you don't need to be a mathematician to enjoy them. Here John Conway presents examples of arithmetical statements that are almost certainly true but likely unprovable; Carlo Séquin explores, compares, and illustrates distinct types of one-sided surfaces known as Klein bottles; Keith Devlin asks what makes a video game good for learning mathematics and shows why many games fall short of that goal; Jordan Ellenberg reports on a recent breakthrough in the study of prime numbers; Stephen Pollard argues that mathematical practice, thinking, and experience transcend the utilitarian value of mathematics; and much, much more.
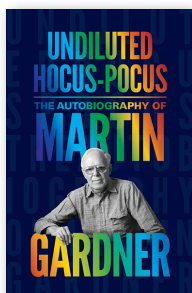
2014. 376 pages. 48 color illus. 59 halftones. 28 line illus.
Pa: 978-0-691-16417-5 $24.95 | £16.95

Foreword by Roger Penrose
The Best Writing on Mathematics 2013
Edited by Mircea Pitici

2014. 272 pages. 30 halftones. 26 line illus.
Pa: 978-0-691-16041-2 $21.95 | £14.95

With a foreword by Persi Diaconis and an afterword by James Randi
Undiluted Hocus-Pocus
The Autobiography of Martin Gardner
Martin Gardner

"For half a century, Martin Gardner (1914–2010) was an international scientific treasure.… Gardner's passion for writing and his warmth and humour shine forth on every page of this book, making it a memoir of a great human being."
—David Singmaster, *Nature*

Martin Gardner wrote the Mathematical Games column for *Scientific American* for twenty-five years and published more than seventy books on topics as diverse as magic, philosophy, religion, pseudoscience, and *Alice in Wonderland*. His informal, recreational approach to mathematics delighted countless readers and inspired many to pursue careers in mathematics and the sciences. Gardner's illuminating autobiography is a disarmingly candid self-portrait of the man evolutionary theorist Stephen Jay Gould called our "single brightest beacon" for the defense of rationality and good science against mysticism and anti-intellectualism.

Undiluted Hocus-Pocus offers a rare, intimate look at Gardner's life and work, and the experiences that shaped both.

2013. 288 pages. 54 halftones.
Cl: 978-0-691-15991-1 $24.95 | £16.95
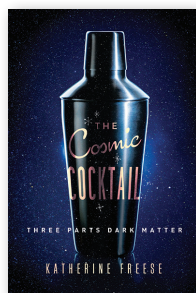
New
The Cosmic Cocktail
Three Parts Dark Matter
Katherine Freese

"In prose as in life, Katherine Freese is never boring.… Clear and accessible … *The Cosmic Cocktail* is an excellent primer for the intrigued generalist, or for those who have spent too much time in particle-physics labs and want to catch up on what cosmologists are up to."
—Francis Halzen, *Nature*

The ordinary atoms that make up the known universe—from our bodies and the air we breathe to the planets and stars—constitute only 5 percent of all matter and energy in the cosmos. The rest is known as dark matter and dark energy, because their precise identities are unknown. *The Cosmic Cocktail* is the inside story of the epic quest to solve one of the most compelling enigmas of modern science—what is the universe made of?—told by one of today's foremost pioneers in the study of dark matter.

Science Essentials

2014. 272 pages. 16 color illus. 63 halftones. 11 line illus.
Cl: 978-0-691-15335-3 $29.95 | £19.95

Read newsworthy and lively commentary on our new blog at *blog.press.princeton.edu*
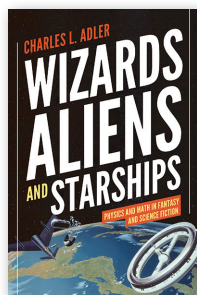
New

Wizards, Aliens, and Starships

Physics and Math in Fantasy and Science Fiction

Charles L. Adler

"Adler does a grand job of showing just how powerful even basic maths and physics can be. If you're a budding back-of-the-envelope boffin not afraid of a bit of algebra, you'll love this book."
—Robert Matthews, *BBC Focus Magazine*

From teleportation and space elevators to alien contact and interstellar travel, science fiction and fantasy writers have come up with some brilliant and innovative ideas. Yet how plausible are these ideas—for instance, could Mr. Weasley's flying car in the Harry Potter books really exist? Which concepts might actually happen, and which ones wouldn't work at all? *Wizards, Aliens, and Starships* delves into the most extraordinary details in science fiction and fantasy—such as time warps, shape changing, rocket launches, and illumination by floating candle—and shows readers the physics and math behind the phenomena.

2014. 392 pages. 23 line illus. 9 tables.
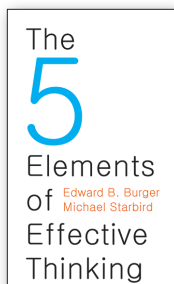Cl: 978-0-691-14715-4 $29.95 | £19.95

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Solving the Twelve Labors of Hercules

Michael Huber

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Pa: 978-0-691-16468-7 $19.95 | £13.95
Cl: 978-0-691-13575-5 $24.95 | £16.95

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"Inspirational and engaging but also educational and immensely practical."
—Anthony J. Sadar, *Washington Times*

2012. 168 pages. 1 halftone.
Cl: 978-0-691-15666-8 $19.95 | £13.95

New Paperback

Elliptic Tales

Curves, Counting, and Number Theory

Avner Ash & Robert Gross

Elliptic Tales describes the latest developments in number theory by looking at one of the most exciting unsolved problems in contemporary mathematics—the Birch and Swinnerton-Dyer Conjecture. In this book, Avner Ash and Robert Gross guide readers through the mathematics they need to understand this captivating problem.

2014. 280 pages. 52 line illus. 16 tables.
Pa: 978-0-691-16350-5 $16.95 | £11.95
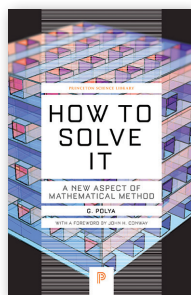Cl: 978-0-691-15119-9 $29.95 | £19.95

With a new preface by the authors

Fearless Symmetry

Exposing the Hidden Patterns of Numbers

Avner Ash & Robert Gross

2008. 312 pages. 1 halftone. 2 line illus.
Pa: 978-0-691-13871-8 $27.95 | £19.95

New Paperback
With a foreword by John H. Conway

How to Solve It

A New Aspect of Mathematical Method

G. Polya

From reviews of the original edition:

"[This] elementary textbook on heuristic reasoning, shows anew how keen its author is on questions of method and the formulation of methodological principles. Exposition and illustrative material are of a disarmingly elementary character, but very carefully thought out and selected."
—Herman Weyl, *Mathematical Review*

Princeton Science Library

2014. 288 pages. 31 line illus.
Pa: 978-0-691-16407-6 $19.95 | £13.95
Not for sale in the Commonwealth (except Canada)

Forthcoming
With an introduction by Thomas Banchoff
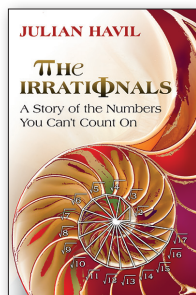
Flatland

A Romance of Many Dimensions

Edwin Abbott Abbott

"One of the most imaginative, delightful and, yes, touching works of mathematics."
—*Washington Post Book World*

Princeton Science Library

April 2015. 144 pages. 12 line illus.
Pa: 978-0-691-16555-4 $12.95 | £8.95

New Paperback
The Irrationals
A Story of the Numbers You Can't Count On
Julian Havil

"The insides of this book are as clever and compelling as the subtitle on the cover."
—Anna Kuchment, *Scientific American*

"*The Irrationals* is a true mathematician's and historian's delight."
—Robert Schaefer, *New York Journal of Books*

"From its lively introduction straight through to a rousing finish this is a book which can be browsed for its collection of interesting facts or studied carefully by anyone with an interest in numbers and their history.... This is a wonderful book."
—Richard Wilders, *MAA Reviews*

2014. 312 pages. 100 line illus.
Pa: 978-0-691-16353-6 $18.95 | £12.95
Cl: 978-0-691-14342-2 $29.95 | £19.95

Impossible?
Surprising Solutions to Counterintuitive Conundrums
Julian Havil

"*Impossible?* is an immensely thought-provoking book. Even if you skim or skip the more complex abstract math, you may have a hard time letting these puzzles go."
—Ray Bert, *Civil Engineering*

2011. 256 pages. 75 line illus.
Pa: 978-0-691-15002-4 $19.95 | £13.95
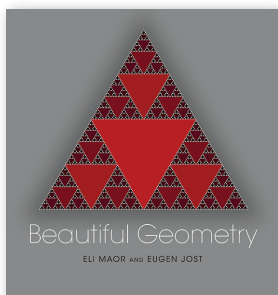
Beautiful Geometry
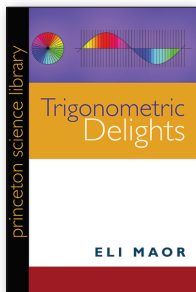**Eli Maor & Eugen Jost**

"[A] book where art and mathematics are in perfect harmony."
—Tony Mann, *Times Higher Education*

"Mathematicians sometimes compare well-constructed equations to works of art. To them, patterns in numbers hold a beauty at least equal to that found in any sonnet or sculpture. In this book, Maor, a math historian, teams with Jost, an artist, to reveal some of that mathematical majesty using jewel-like visualizations of classic geometric theorems.... The result is a book that stimulates the mind as well as the eye."
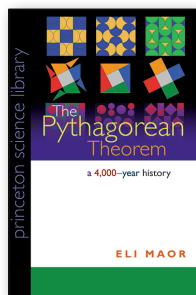—Lee Billings, *Scientific American*

2014. 208 pages. 60 color illus. 38 halftones.
Cl: 978-0-691-15099-4 $27.95 | £19.95

Trigonometric Delights
Eli Maor

"[Maor] writes enthusiastically and engagingly. . . . Delightful reading from cover to cover. *Trigonometric Delights* is a welcome addition."
—Sean Bradley, *MAA Online*

"Maor clearly has a great love of trigonometry, formulas and all, and his enthusiasm shines through.... If you always wanted to know where trigonometry came from, and what it's good for, you'll find plenty here to enlighten you."
—Ian Stewart, *New Scientist*

Princeton Science Library
2013. 256 pages. 3 halftones. 104 line illus.
Pa: 978-0-691-15820-4 $18.95 | £12.95

Honorable Mention, 2007 Award for Best Professional/Scholarly Book in Mathematics, Association of American Publishers
The Pythagorean Theorem
A 4,000-Year History
Eli Maor

"This excellent biography of the theorem is like a history of thought written in lines and circles, moving from ancient clay tablets to Einstein's blackboards.... There is something intoxicating about seeing one truth revealed in so many ways. It all makes for hours of glorious mathematical distraction."
—Ben Longstaff, *New Scientist*

Princeton Science Library
2010. 288 pages. 9 color illus. 141 line illus. 2 tables.
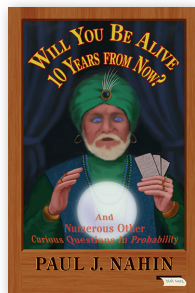Pa: 978-0-691-14823-6 $17.95 | £12.50
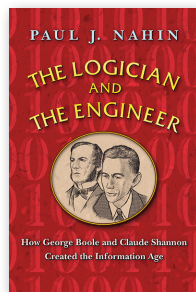
Will You Be Alive 10 Years from Now?
And Numerous Other Curious Questions in Probability
Paul J. Nahin

"A wonderful book for trained math lovers who enjoy the mental stimulation provided by a good mathematics puzzle."
—Harold D. Shane, *Library Journal*

2013. 256 pages. 28 line illus. 17 tables.
Cl: 978-0-691-15680-4 $27.95 | £19.95

The Logician and the Engineer
How George Boole and Claude Shannon Created the Information Age
Paul J. Nahin

"Meshing logic problems with the stories of two extraordinary men—Victorian philosopher–mathematician George Boole and twentieth-century information theorist Claude Shannon—Paul Nahin fashions a tale of innovation and discovery."
—*Nature*

2012. 248 pages. 2 halftones. 41 line illus. 25 tables.
Cl: 978-0-691-15100-7 $24.95 | £16.95
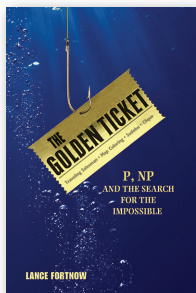
One of Choice's Outstanding Academic Titles for 2013
One of Amazon.com's Best Science Books of 2013
Honorable Mention, 2013 PROSE Award in Popular Science and Mathematics, Association of American Publishers
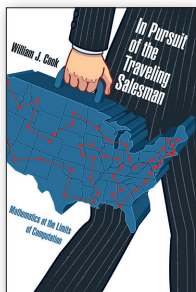
The Golden Ticket
P, NP, and the Search for the Impossible
Lance Fortnow

"Fortnow's book is just the ticket for bringing one of the major theoretical problems of our time to the level of the average citizen."
—Veit Elser, *Science*

2013. 192 pages. 40 halftones. 41 line illus.
Cl: 978-0-691-15649-1 $26.95 | £18.95

New Paperback
In Pursuit of the Traveling Salesman
Mathematics at the Limits of Computation
William J. Cook

"An excellent place for an interested amateur to get the gist of these big ideas in a down-to-earth discussion."
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2014. 248 pages. 113 color illus. 19 halftones. 19 line illus. 2 tables.
Pa: 978-0-691-16352-9 $16.95 | £11.95
Cl: 978-0-691-15270-7 $27.95 | £19.95
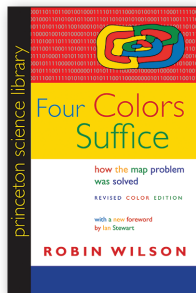
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Pa: 978-0-691-15822-8 $24.95 | £16.95
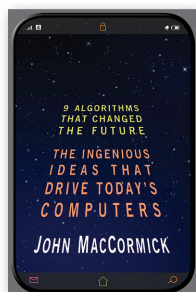
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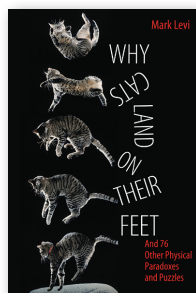
Why Cats Land on Their Feet
And 76 Other Physical Paradoxes and Puzzles
Mark Levi

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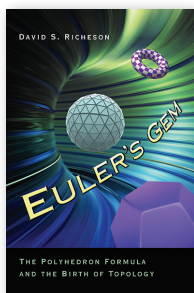—*SEED Magazine*

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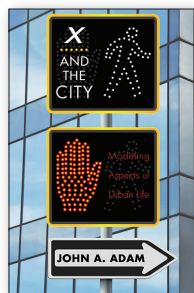
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Honorable Mention, 2012 PROSE Award, Popular Science and Popular Mathematics, Association of American Publishers

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Slicing Pizzas, Racing Turtles, and Further Adventures in Applied Mathematics
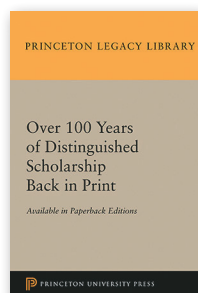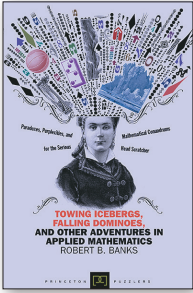**Robert B. Banks**

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Ronald S. Calinger

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—Kathryn M. Olesko, Georgetown University

This is the first full-scale biography of Leonhard Euler (1707–83), 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 chiefly on Euler's massive published works and correspondence, which fill more than eighty volumes so far, 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—especially calculus, number theory, notation, optics, and celestial, rational, and fluid mechanics—to his advancements in shipbuilding, telescopes, ballistics, cartography, chronology, and music theory.

July 2015. 808 pages. 55 halftones.
Cl: 978-0-691-11927-4 $49.50 | £34.95

Forthcoming Paperback
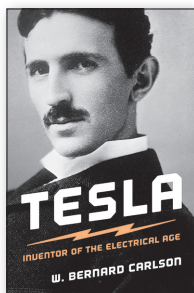One of Choice's Outstanding Academic Titles for 2013
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—W. Patrick McCray, *Nature*

In this groundbreaking book, W. Bernard Carlson demystifies the legendary inventor, placing him within the cultural and technological context of his time, and focusing on his inventions themselves as well as the creation and maintenance of his celebrity. This major biography sheds new light on Tesla's visionary approach to invention and the business strategies behind his most important technological breakthroughs.

May 2015. 520 pages. 75 halftones.
Pa: 978-0-691-16561-5 $19.95 | £13.95
Cl: 978-0-691-05776-7 $29.95 | £19.95
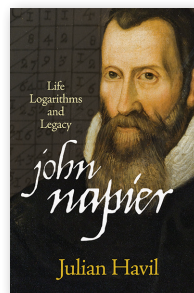
New
John Napier
Life, Logarithms, and Legacy
Julian Havil

"Havil has crafted a complete biography of John Napier, including detailed explanations of his mathematical creations, all in the proper historical context. Readers will gain a deep understanding of the background and uses of the logarithm, as well as the significance of Napier's achievement."
—Paul C. Pasles, author of *Benjamin Franklin's Numbers*

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.

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Siobhan Roberts

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—Allan McRobie, *Nature*

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—*Kirkus Reviews* (starred review)

One of Choice's Outstanding Academic Titles for 2013

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A Scientific Biography
Jeremy Gray

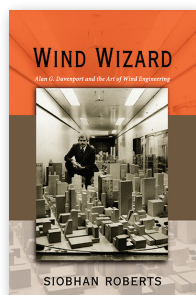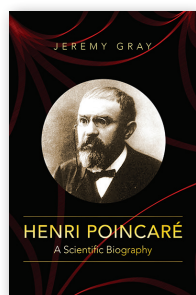"[M]asterly … Gray encapsulates Poincaré's multiple dimensions; his intellectual biography is both a tour de force and a triumph of readability."
—George Szpiro, *Nature*
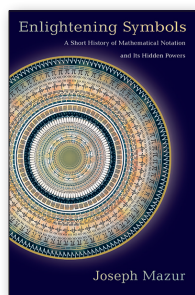
New
Enlightening Symbols
A Short History of Mathematical Notation and Its Hidden Powers
Joseph Mazur

"[A] fascinating narrative…. This is a nuanced, intelligently framed chronicle packed with nuggets—such as the fact that Hindus, not Arabs, introduced Arabic numerals. In a word: enlightening."
—George Szpiro, *Nature*

"*Enlightening Symbols* retraces the winding road that has led to the way we now teach, study, and conceive mathematics…. Thanks to Mazur's playful approach to the subject, *Enlightening Symbols* offers an enjoyable read."
—Gaia Donati, *Science*

From words to abbreviations to symbols, this book shows how math evolved to the familiar forms we use today.

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Joseph Mazur

"A book worth taking a chance on."
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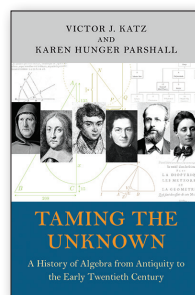
New
Taming the Unknown
A History of Algebra from Antiquity to the Early Twentieth Century
Victor J. Katz & Karen Hunger Parshall

"*Taming the Unknown* is well written and informative, and will satisfy any reader with an interest in the history of algebra. Striking just the right balance between general overview and technical detail, this book is a pleasure to read."
—Joseph W. Dauben, City University of New York, Graduate Center

What is algebra? For some, it is an abstract language of x's and y's. For mathematics majors and professional mathematicians, it is a world of axiomatically defined constructs like groups, rings, and fields. *Taming the Unknown* considers how these two seemingly different types of algebra evolved and how they relate. Victor Katz and Karen Parshall explore the history of algebra, from its roots in the ancient civilizations of Egypt, Mesopotamia, Greece, China, and India, through its development in the medieval Islamic world and medieval and early modern Europe, to its modern form in the early twentieth century.

Taming the Unknown follows algebra's remarkable growth through different epochs around the globe.
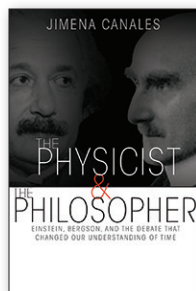
Forthcoming
The Physicist and the Philosopher
Einstein, Bergson, and the Debate That Changed Our Understanding of Time
Jimena Canales

"A fascinating look at a pivotal moment in how we think about one of the most fundamental features of the universe."
—Sean Carroll, author of *From Eternity to Here: The Quest for the Ultimate Theory of Time*

On April 6, 1922, in Paris, Albert Einstein and Henri Bergson publicly debated the nature of time. Einstein considered Bergson's theory of time to be a soft, psychological notion, irreconcilable with the quantitative realities of physics. Bergson, who gained fame as a philosopher by arguing that time should not be understood exclusively through the lens of science, criticized Einstein's theory of time for being a metaphysics grafted on to science, one that ignored the intuitive aspects of time. *The Physicist and the Philosopher* tells the remarkable story of how this explosive debate transformed our understanding of time and drove a rift between science and the humanities that persists today.

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"This book will play a vital role in introducing new readers to Einstein and the many fascinating questions surrounding his work."
—Richard Staley, author of *Einstein's Generation: The Origins of the Relativity Revolution*

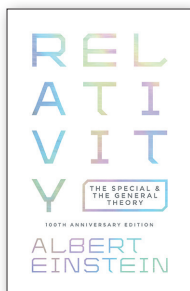Published on the hundredth anniversary of general relativity, this handsome edition of Einstein's famous book places the work in historical and intellectual context while providing invaluable insight into one of the greatest scientific minds of all time.

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Albert Einstein
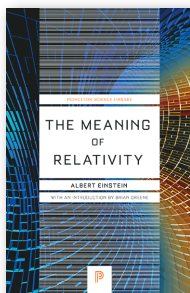
From a review of the 1956 edition:

"A condensed unified presentation intended for one who has already gone through a standard text and digested the mechanics of tensor theory and the physical basis of relativity. Einstein's little book … serves as an excellent tying-together of loose ends and as a broad survey of the subject."
—*Physics Today*

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Pa: 978-0-691-16408-3 $19.95 | £13.95
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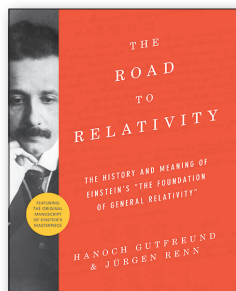
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—Peter Galison, Harvard University

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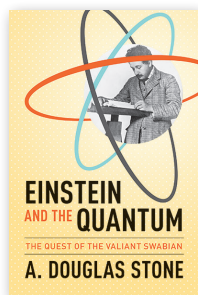
One of Scientific American's Best 2013 Books for the Physics Fan
One of Science Friday's Science Book Picks for 2013
Winner of the 2014 Phi Beta Kappa Book Award in Science

Einstein and the Quantum
The Quest of the Valiant Swabian
A. Douglas Stone

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—Ira Flatow, *Science Friday, NPR*

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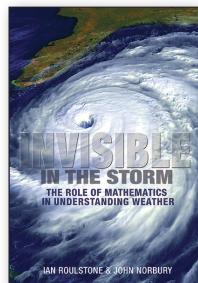
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The Role of Mathematics in Understanding Weather
Ian Roulstone & John Norbury

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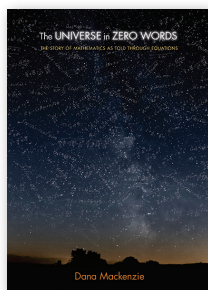
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Cl: 978-0-691-15282-0 $27.95 | £19.95
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Newton and the Origin of Civilization
Jed Z. Buchwald & Mordechai Feingold

"Buchwald and Feingold's book is full of remarkable details, insights, and incidents."
—Ernest Davis, *SIAM News*

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Circles Disturbed
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"It should encourage scientists to grasp the logic behind storytelling and literary critics to sense the allure of mathematics."
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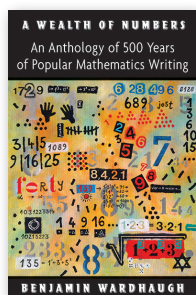
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Edited by Benjamin Wardhaugh

"Fascinating to browse, a delight to read, and informative…. Get this book! It is as much fun to read as it is to share with others."
—Jerry Johnson, *Mathematics Teacher*

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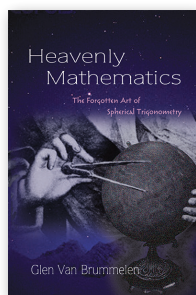
One of Choice's Outstanding Academic Titles for 2013
Shortlisted for the 2013 Neumann Book Prize, British Society for the History of Mathematics

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Glen Van Brummelen

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Forthcoming

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An Introduction to Theory and Applications
Michael Shearer & Rachel Levy

This textbook provides beginning graduate students and advanced undergraduates with an accessible introduction to the rich subject of partial differential equations (PDEs). It presents a rigorous and clear explanation of the more elementary theoretical aspects of PDEs, while also drawing connections to deeper analysis and applications. The book serves as a needed bridge between basic undergraduate texts and more advanced books that require a significant background in functional analysis.

Topics include first order equations and the method of characteristics, second order linear equations, wave and heat equations, Laplace and Poisson equations, and separation of variables. The book also covers fundamental solutions, Green's functions and distributions, beginning functional analysis applied to elliptic PDEs, traveling wave solutions of selected parabolic PDEs, and scalar conservation laws and systems of hyperbolic PDEs.

May 2015. 296 pages. 49 line illus.
Cl: 978-0-691-16129-7 $85.00 | £59.00

"The material is presented in a new and innovative way, stressing more modern ideas in PDEs while keeping the approach accessible. . . . Shearer and Levy are both highly regarded researchers and educators in the field."
—David Uminsky, University of San Francisco

New

Mathematics for the Life Sciences
Erin N. Bodine, Suzanne Lenhart & Louis J. Gross

The life sciences deal with a vast array of problems at different spatial, temporal, and organizational scales. The mathematics necessary to describe, model, and analyze these problems is similarly diverse, incorporating quantitative techniques that are rarely taught in standard undergraduate cour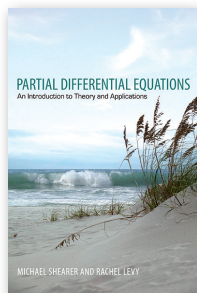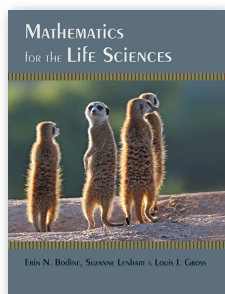ses. This textbook provides an accessible introduction to these critical mathematical concepts, linking them to biological observation and theory while also presenting the computational tools needed to address problems not readily investigated using mathematics alone.

Proven in the classroom and requiring only a background in high school math, *Mathematics for the Life Sciences* doesn't just focus on calculus as do most other textbooks on the subject. It covers deterministic methods and those that incorporate uncertainty, problems in discrete and continuous time, probability, graphing and data analysis, matrix modeling, difference equations, differential equations, and much more. The book uses MATLAB throughout, explaining how to use it, write code, and connect models to data in examples chosen from across the life sciences.

2014. 640 pages. 50 color illus. 100 line illus.
Cl: 978-0-691-15072-7 $85.00 | £59.00

"This is the book I always wanted to write, a masterful and thorough introduction to the basic mathematical, statistical, and computational tools one needs to address biological problems, punctuated with solid and motivational applications to biology."
—Simon A. Levin, editor of *The Princeton Guide to Ecology*

Introduction to Computational Science
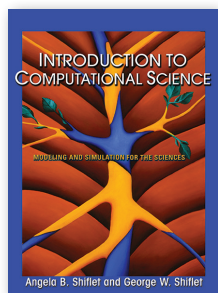
New Second Edition

Introduction to Computational Science
Modeling and Simulation for the Sciences
**Angela B. Shiflet &
George W. Shiflet**

Praise for the previous edition:

"A masterpiece. I know of nothing comparable. I give it five stars."
—James M. Cargal, *UMAP Journal*

"This is an important book with a wonderful collection of examples, models, and references."
—Robert M. Panoff, Shodor Education Foundation

Computational science is an exciting new field at the intersection of the sciences, computer science, and mathematics because much scientific investigation now involves computing as well as theory and experiment. This textbook provides students with a versatile and accessible introduction to the subject. It assumes only a background in high school algebra, enables instructors to follow tailored pathways through the material, and is the only textbook of its kind designed specifically for an introductory course in the computational science and engineering curriculum. While the text itself is generic, an accompanying website offers tutorials and files in a variety of software packages.

2014. 856 pages. 3 halftones.
204 line illus. 80 tables.
Cl: 978-0-691-16071-9 $99.50 | £69.95
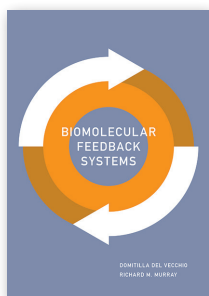
New

Biomolecular Feedback Systems
**Domitilla Del Vecchio &
Richard M. Murray**

"This is an excellent compendium of the most important techniques and results in the application of feedback and control to biomolecular systems. *Biomolecular Feedback Systems* is very timely, and a must-read for students and researchers."
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An Introduction for Scientists and Engineers
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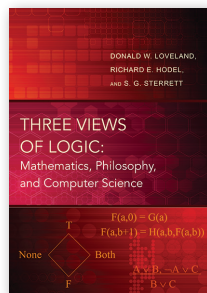
New

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Donald W. Loveland, Richard E. Hodel & S. G. Sterrett

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Demonstrating the different roles that logic plays in the disciplines of computer science, mathematics, and philosophy, this concise undergraduate textbook covers select topics from three different areas of logic: proof theory, computability theory, and nonclassical logic. The book balances accessibility, breadth, and rigor, and is designed so that its materials will fit into a single semester. Its distinctive presentation of traditional logic material will enhance readers' capabilities and mathematical maturity.

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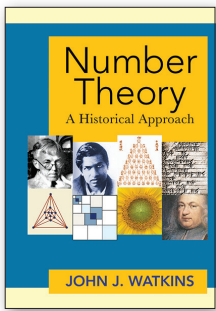
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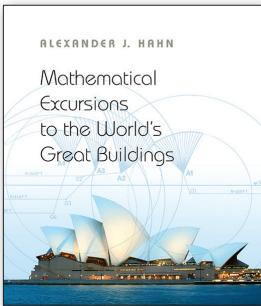
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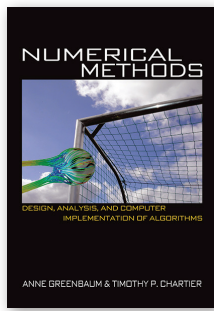
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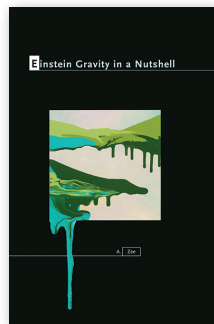
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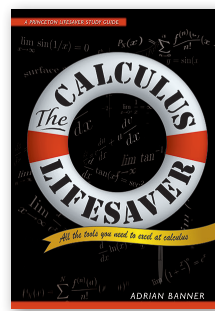
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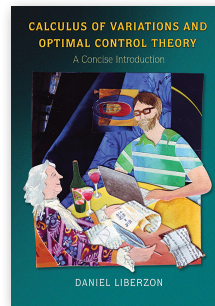
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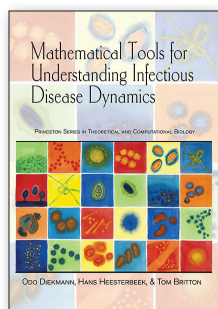
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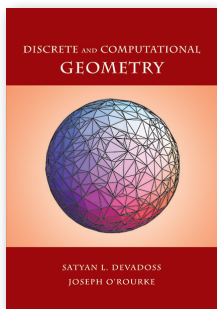
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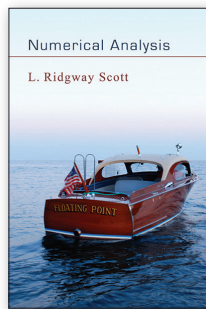
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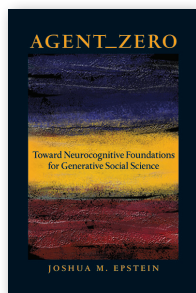
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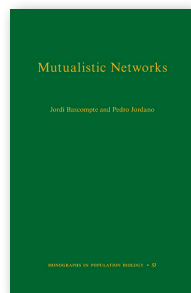
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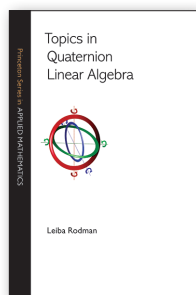
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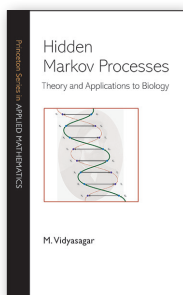
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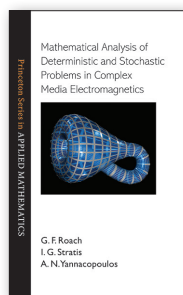
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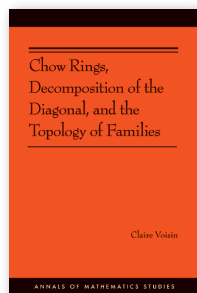
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In this book, Claire Voisin provides an introduction to algebraic cycles on complex algebraic varieties, to the major conjectures relating them to cohomology, and even more precisely to Hodge structures on cohomology. The volume is intended for both students and researchers, and not only presents a survey of the geometric methods developed in the last thirty years to understand the famous Bloch-Beilinson conjectures, but also examines recent work by Voisin.

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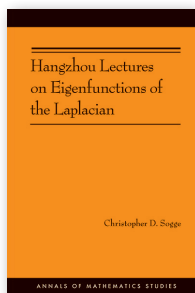
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Hangzhou Lectures on Eigenfunctions of the Laplacian

Christopher D. Sogge

Based on lectures given at Zhejiang University in Hangzhou, China, and Johns Hopkins University, this book introduces eigenfunctions on Riemannian manifolds. Christopher Sogge gives a proof of the sharp Weyl formula for the distribution of eigenvalues of Laplace-Beltrami operators, as well as an improved version of the Weyl formula, theDuistermaat-Guillemin theorem under natural assumptions on the geodesic flow. Sogge shows that there is quantum ergodicity of eigenfunctions if the geodesic flow is ergodic.

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Charles L. Epstein & Rafe Mazzeo

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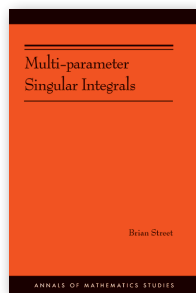
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Multi-parameter Singular Integrals

Brian Street

This book develops a new theory of multi-parameter singular integrals associated with Carnot-Carathéodory balls. Brian Street first details the classical theory of Calderón-Zygmund singular integrals and applications to linear partial differential equations. He then outlines the theory of multi-parameter Carnot-Carathéodory geometry, where the main tool is a quantitative version of the classical theorem of Frobenius. Street then gives several examples of multi-parameter singular integrals arising naturally in various problems. The final chapter of the book develops a general theory of singular integrals that generalizes and unifies these examples. This is one of the first general theories of multi-parameter singular integrals that goes beyond the product theory of singular integrals and their analogs.

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Spyros Alexakis

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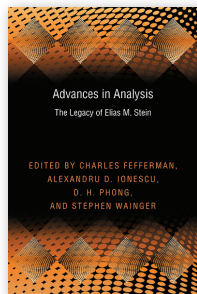
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2014. 480 pages. 6 halftones. 32 line illus.
Cl: 978-0-691-15941-6 $99.50 | £69.95

New

Frontiers in Complex Dynamics
In Celebration of John Milnor's 80th Birthday
Edited by Araceli Bonifant, Mikhail Lyubich & Scott Sutherland

In honor of John Milnor's eightieth birthday, this book gathers together surveys and papers inspired by his work, from distinguished experts examining not only holomorphic dynamics in one and several variables, but also differential geometry, entropy theory, and combinatorial group theory.

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Cl: 978-0-691-15929-4 $99.50 | £69.95

Forthcoming

Action-minimizing Methods in Hamiltonian Dynamics
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Alfonso Sorrentino

John Mather's seminal works in Hamiltonian dynamics represent some of the most important contributions to our understanding of the complex balance between stable and unstable motions in classical mechanics. His novel approach—known as Aubry-Mather theory—singled out the existence of special orbits and invariant measures of the system, which possess a very rich dynamical and geometric structure. This book provides a comprehensive introduction to Mather's theory.

June 2015. 144 pages. 4 line illus.
Pa: 978-0-691-16450-2 $45.00 | £30.95
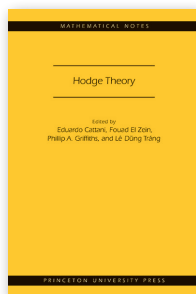
New

Hodge Theory
Edited by Eduardo Cattani, Fouad El Zein, Phillip A. Griffiths & Lê Dũng Tráng

This book provides a comprehensive and up-to-date introduction to Hodge theory—one of the central and most vibrant areas of contemporary mathematics—from leading specialists on the subject.

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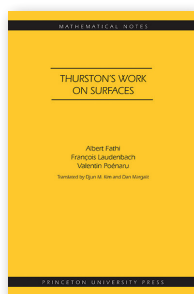
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Albert Fathi, François Laudenbach & Valentin Poénaru
Translated by Djun M. Kim & Dan Margalit

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