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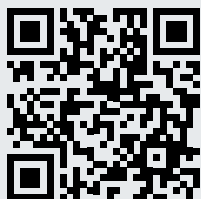
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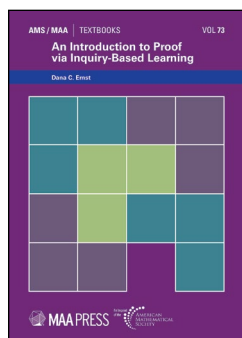
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An Introduction to Proof via Inquiry-Based Learning

Dana C. Ernst, *Northern Arizona University, Flagstaff, AZ*

Designed to promote active learning through inquiry, the book features a highly structured set of leading questions and explorations.

AMS/MAA Textbooks, Volume 73

2022; 169 pp.; softcover; ISBN: 978-1-4704-6333-5; List US$30; AMS members US$22.50; MAA members US$22.50; Order code: TEXT/73
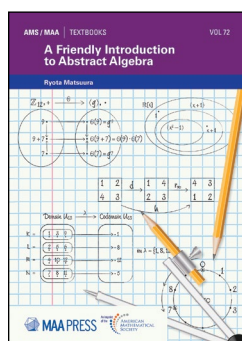
A Friendly Introduction to Abstract Algebra

Ryota Matsuura, *St. Olaf College, Northfield, MN*

A Friendly Introduction to Abstract Algebra offers a new approach to laying a foundation for abstract mathematics. Prior experience with proofs is not assumed, and the book takes time to build proof-writing skills in ways that will serve students through a lifetime of learning and creating mathematics.

The author's pedagogical philosophy is that when students abstract from a wide range of examples, they are better equipped to conjecture, formalize, and prove new ideas in abstract algebra. Thus, students thoroughly explore all concepts through illuminating examples before formal definitions are introduced. The instruction in proof writing is similarly grounded in student exploration and experience. Throughout the book, the author carefully explains where the ideas in a given proof come from, along with hints and tips on how students can derive those proofs on their own.

Readers of this text are not just consumers of mathematical knowledge. Rather, they are learning mathematics by *creating* mathematics.

AMS/MAA Textbooks, Volume 72

2022; 387 pp.; softcover; ISBN: 978-1-4704-6881-1; List US$69; AMS members US$51.75; MAA members US$51.75; Order code: TEXT/72
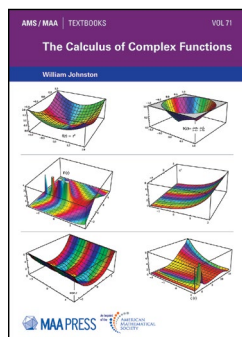
The Calculus of Complex Functions

**William Johnston**, *Butler University, Indianapolis, IN*

The book introduces complex analysis as a natural extension of the calculus of real-valued functions. The mechanism for doing so is the *extension theorem*, which states that any real analytic function extends to an analytic function defined in a region of the complex plane. The connection to real functions and calculus is then natural. The introduction to analytic functions feels intuitive and their fundamental properties are covered quickly. As a result, the book allows a surprisingly large coverage of the classical analysis topics of analytic and meromorphic functions, harmonic functions, contour integrals and series representations, conformal maps, and the Dirichlet problem. It also introduces several more-advanced notions, including the Riemann hypothesis and operator theory, in a manner accessible to undergraduates. The last chapter describes bounded linear operators on Hilbert and Banach spaces, including the spectral theory of compact operators, in a way that also provides an excellent review of important topics in linear algebra and provides a pathway to undergraduate research topics in analysis.

There are over one thousand exercises of a variety of types and levels. Every chapter contains an essay describing a part of the history of the subject and at least one connected collection of exercises that, together, comprise a project-level exploration.

AMS/MAA Textbooks, Volume 71

2022; 433 pp.; softcover; ISBN: 978-1-4704-6565-0; List US$85; AMS members US$63.75; MAA members US$63.75; Order code: TEXT/71
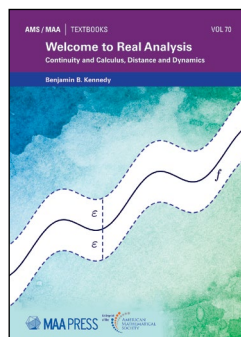
Welcome to Real Analysis

### Continuity and Calculus, Distance and Dynamics

Benjamin B. Kennedy, *Gettysburg College, PA*

Welcome to Real Analysis is designed for use in an introductory undergraduate course in real analysis. The exposition is exceedingly clear and well-motivated. There is a wide variety of exercises and many pedagogical innovations. For example, each chapter includes Reading Questions so that students can check their understanding. In addition to the standard material in a first real analysis course, the book contains two concluding chapters on dynamical systems and fractals as an illustration of the power of the theory developed.

AMS/MAA Textbooks, Volume 70

2022; 360 pp.; softcover; ISBN: 978-1-4704-6454-7; List US$69; AMS members US$51.75; MAA members US$51.75; Order code: TEXT/70
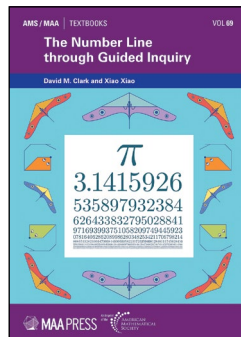
The Number Line through Guided Inquiry

David M. Clark, *SUNY, New Paltz, NY*, and **Xiao Xiao**, *Utica College, NY*

The Number Line through Guided Inquiry is designed to give future secondary teachers a deep understanding of the real numbers and functions on the reals. Written in

a guided-inquiry format, this book consists of a carefully scaffolded sequence of definitions, problems, and theorems that guides students through each topic. Students will learn not only the mathematics, but also how to help others learn mathematics. Ultimately, they will learn to work as a team to answer the bigger questions and build a common understanding of the broader subject.

AMS/MAA Textbooks, Volume 69

2022; 124 pp.; softcover; ISBN: 978-1-4704-6504-9; List US$45; AMS members US$33.75; MAA members US$33.75; Order code: TEXT/69
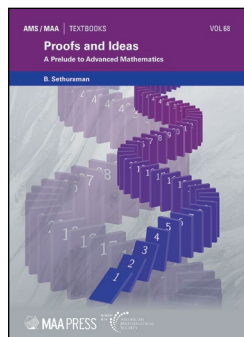
Proofs and Ideas

A Prelude to Advanced Mathematics

B. Sethuraman, *California State University, Northridge, CA, and Krea University, Sri City, India*

Proofs and Ideas serves as a gentle introduction to advanced mathematics for students who previously have not had extensive exposure to proofs. It is intended to ease the student's transition from algorithmic mathematics to the world of mathematics that is built around proofs and concepts.

The spirit of the book is that the basic tools of abstract mathematics are best developed in context and that creativity and imagination are at the core of mathematics. The book contains hundreds of exercises, both routine and nonroutine.

AMS/MAA Textbooks, Volume 68

2021; 334 pp.; softcover; ISBN: 978-1-4704-6514-8; List US$85; AMS members US$63.75; MAA members US$63.75; Order code: TEXT/68
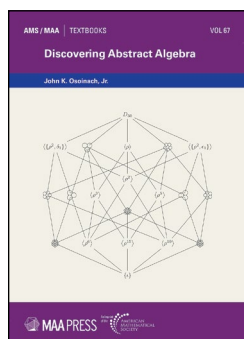
Discovering Abstract Algebra

John K. Osoinach, Jr, *The University of Dallas, Irving, TX*

Discovering Abstract Algebra takes an Inquiry-Based Learning approach to the subject, leading students to discover for themselves its main themes and techniques. Concepts are introduced conversationally through extensive examples and student investigation before being formally defined. Students will develop skills in carefully making statements and writing proofs, while they simultaneously build a sense of ownership over the ideas and results.

AMS/MAA Textbooks, Volume 67

2021; 199 pp.; softcover; ISBN: 978-1-4704-6442-4; List US$69; AMS members US$51.75; MAA members US$51.75; Order code: TEXT/67
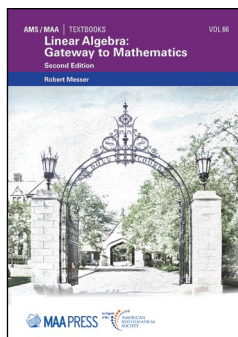
Linear Algebra: Gateway to Mathematics

Second Edition

Robert Messer, *Albion College, MI*

Linear Algebra: Gateway to Mathematics uses linear algebra as a vehicle to introduce students to the inner workings of mathematics. The structures and techniques of mathematics in turn provide an accessible framework to illustrate the powerful and beautiful results about vector spaces and linear transformations.

Students are gently introduced to abstractions of higher mathematics through discussions of the logical structure of proofs, the need to translate terminology into notation, and efficient ways to discover and present proofs. Application of linear algebra and concrete examples tie the abstract concepts to familiar objects from algebra, geometry, calculus, and everyday life.

AMS/MAA Textbooks, Volume 66

2021; 420 pp.; softcover; ISBN: 978-1-4704-6295-6; List US$89; AMS members US$66.75; MAA members US$66.75; Order code: TEXT/66
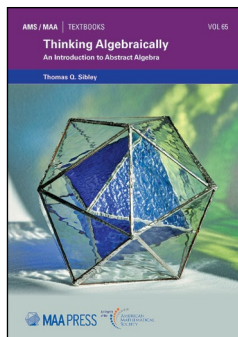
Thinking Algebraically

An Introduction to Abstract Algebra

**Thomas Q. Sibley**, *St. John's University, Collegeville, MN*

Thinking Algebraically presents the insights of abstract algebra in a welcoming and accessible way. It succeeds in combining the advantages of rings-first and groups-first approaches while avoiding the disadvantages. The exposition is clear and conversational throughout.

The book has numerous exercises in each section, as well as supplemental exercises and projects for each chapter. Many examples and well over 100 figures provide support for learning. Short biographies introduce the mathematicians who proved many of the results.

AMS/MAA Textbooks, Volume 65

2021; 478 pp.; softcover; ISBN: 978-1-4704-6030-3; List US$85; AMS members US$63.75; MAA members US$63.75; Order code: TEXT/65
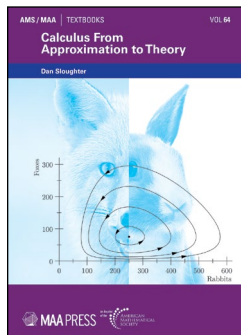
Calculus From Approximation to Theory

Dan Sloughter, *Furman University, Greenville, SC*

Calculus from Approximation to Theory takes a fresh and innovative look at the teaching and learning of calculus. One way to describe calculus might be to say it is a suite of techniques that approximate curved things by flat things and through a limiting process applied to those approximations arrive at an exact answer. Standard approaches to calculus focus on that limiting process as the heart of the matter. This text places its emphasis on the approximating processes and, thus, illuminates the motivating ideas and makes clearer the scientific usefulness, indeed centrality, of the subject while paying careful attention to the theoretical foundations. All of the central topics of a year-long calculus course are covered, with the addition of treatment of difference equations, a chapter on the complex plane as the arena for motion in two dimensions, and a much more thorough and modern treatment of differential equations than is standard.

AMS/MAA Textbooks, Volume 64

2020; 571 pp.; softcover; ISBN: 978-1-4704-5588-0; List US$99; AMS members US$74.25; MAA members US$74.25; Order code: TEXT/64

Common Sense Mathematics

Second Edition

Ethan D. Bolker, *University of Massachusetts Boston, MA*, and **Maura B. Mast**, *Fordham University, Bronx, NY*

Ten years from now, what do you want or expect your students to remember from your course? Using our text, students work regularly with real data in moderately complex everyday contexts, using mathematics as a tool and common sense as a guide. The focus is on problems suggested by the news of the day and topics that matter to students, like inflation, credit card debt, and loans. We use search engines, calculators, and spreadsheet programs as tools to reduce drudgery, explore patterns, and get information. Technology is an integral part of today's world—this text helps students use it thoughtfully and wisely.

This second edition contains revised chapters and additional sections, updated examples and exercises, and complete rewrites of critical material based on feedback from students and teachers who have used this text. Our focus remains the same: to help students to think carefully—and critically—about numerical information in everyday contexts.

AMS/MAA Textbooks, Volume 63

2021; 342 pp.; softcover; ISBN: 978-1-4704-6134-8; List US$75; AMS members US$56.25: MAA members US$56.25; Order code: TEXT/63
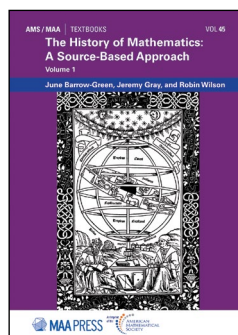
The History of Mathematics: A Source-Based Approach, Vols. 1 & 2

June Barrow-Green, **Jeremy Gray**, and **Robin Wilson**, *The Open University, Milton Keynes, United Kingdom*

The History of Mathematics: A Source-Based Approach is a comprehensive history of the development of mathematics. The first volume of the two-volume set takes readers from the beginning of counting in prehistory to 1600 and the threshold of the discovery of calculus. It is notable for the extensive engagement with original—primary and secondary—source material. The coverage is worldwide, and embraces developments, including education, in Egypt, Mesopotamia, Greece, China, India, the Islamic world, and Europe. The emphasis on astronomy and its historical relationship to mathematics is new, and the presentation of every topic is informed by the most recent scholarship in the field.

The second volume takes the reader from the invention of the calculus to the beginning of the twentieth century. The initial discoverers of calculus are given thorough investigation, and special attention is also paid to Newton's *Principia*. The eighteenth century is presented as primarily a period of the development of calculus, particularly in differential equations and applications of mathematics. Mathematics blossomed in the nineteenth century, and the book explores progress in geometry, analysis, foundations, algebra, and applied mathematics, especially celestial mechanics. The approach throughout is markedly historiographic: How do we know what we know? How do we read the original documents? What are the institutions supporting mathematics? Who are the people of mathematics? The reader learns not only the history of mathematics, but also how to think like a historian.

To order individual parts/volumes or the complete set, please specify the relevant order code.

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Volume 1: 2019; 488 pp.; hardcover; ISBN: 978-1-4704-4352-8; List US$89; AMS members US$66.75; MAA members US$66.75; Order code: TEXT/45
Volume 2: 2022; 687 pp.; hardcover; ISBN: 978-1-4704-4382-5; List US$89; AMS members US$66.75; MAA members US$66.75; Order code: TEXT/61

Set: 2021; 1212 pp.; hardcover; ISBN: 978-1-4704-6499-8; List US$160; AMS members US$120; MAA members US$120; Order code: TEXT-GREEN-SET
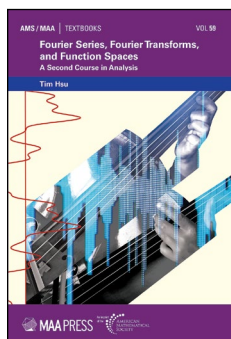
Fourier Series, Fourier Transforms, and Function Spaces
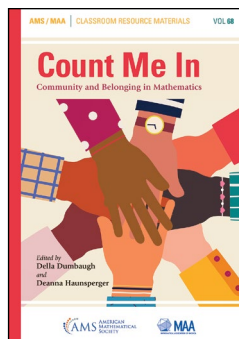
A Second Course in Analysis

Tim Hsu, *San José State University, CA*

Fourier Series, Fourier Transforms, and Function Spaces is designed as a text-book for a second course or capstone course in analysis for advanced undergraduate or beginning graduate students. Students interested in statistics (time series), machine learning (kernel methods), mathematical physics (quantum mechanics), or electrical engineering (signal processing) will find this book useful. With 400 problems, many of which guide readers in developing key theoretical concepts themselves, this text can also be adapted to self-study or an inquiry-based approach. Finally, of course, this text can also serve as motivation and preparation for students going on to further study in analysis.

AMS/MAA Textbooks, Volume 59

2020; 354 pp.; hardcover; ISBN: 978-1-4704-5145-5; List US$79; AMS members US$59.25; MAA members US$59.25; Order code: TEXT/59

Classroom Resource Materials

Exploring Mathematics with CAS Assistance

Topics in Geometry, Algebra, Univariate Calculus, and Probability

Lydia S. Novozhilova, *Western Connecticut State University, Danbury, CT*, and **Robert D. Dolan**, *University of Connecticut, Storrs, CT*

Exploring Mathematics with CAS Assistance is designed as a textbook for an innovative mathematics major course in using a computer-algebra system (CAS) to investigate, explore, and apply mathematical ideas and techniques in problem solving. The book is designed modularly with student investigations and projects in number theory, geometry, algebra, single-variable calculus, and probability. The goal is to provoke an inquiry mindset in students and to arm them with the CAS tools to investigate low-entry, open-ended questions in a variety of mathematical arenas. Because of the modular design, the individual chapters could also be used selectively to design student projects in a number of upper-division mathematics courses.

Classroom Resource Materials, Volume 69

2022; approximately 245 pp.; softcover; ISBN: 978-1-4704-6988-7; List US$65; AMS members US$48.75; MAA members US$48.75; Order code: CLRM/69

Count Me In

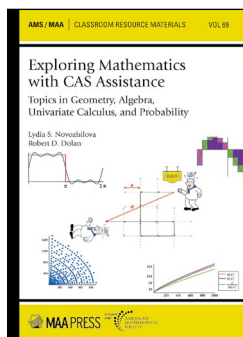### Community and Belonging in Mathematics

Della Dumbaugh, *University of Richmond, VA*, and **Deanna Haunsperger**, *Carleton College, Northfield, MN*, Editors

This groundbreaking work explores the powerful role of communities in mathematics. It introduces readers to twenty-six different mathematical communities and addresses important questions about how they form, how they thrive, and how they advance individuals and the group as a whole. The chapters celebrate how diversity and sameness bind colleagues together, showing how geography, gender, or graph theory can create spaces for colleagues to establish connections in the discipline. They celebrate outcomes measured by mathematical results and by increased interest in studying mathematics. They highlight the value of relationships with peers and colleagues at various stages of their careers.

Classroom Resource Materials, Volume 68

2022; 241 pp.; softcover; ISBN: 978-1-4704-6566-7; List US$65; AMS members US$48.75; MAA members US$48.75; Order code: CLRM/68

## Testimonios

Stories of Latinx and Hispanic Mathematicians

Pamela E. Harris, *Williams College, Williamstown, MA*, **Alicia Prieto-Langarica**, *Youngstown State University, OH*, **Vanessa Rivera Quiñones**, *Equilo and Universidad Sagrado Corazón, San Juan, Puerto Rico*, **Luis Sordo Vieira**, *University of Florida, Gainsville, FL*, **Rosaura Uscanga**, *Mercy College, Dobbs Ferry, NY*, and **Andrés R. Vindas Meléndez**, *MSRI, Berkeley, CA, and University of California, Berkeley, CA*, Editors

Testimonios brings together first-person narratives from the vibrant, diverse, and complex Latinx and Hispanic mathematical community. Their particular stories, told in their own voices, from their own perspectives, give visibility to some of the experiences of Latinx/Hispanic mathematicians.

Testimonios aims to provide a window for mathematicians (and aspiring mathematicians) from all ethnicities, with the hope of inspiring a better understanding of the diversity of the mathematical community.

Classroom Resource Materials, Volume 67

2021; 286 pp.; softcover; ISBN: 978-1-4704-6657-2; List US$25; AMS members US$18.75; MAA members US$18.75; Order code: CLRM/67
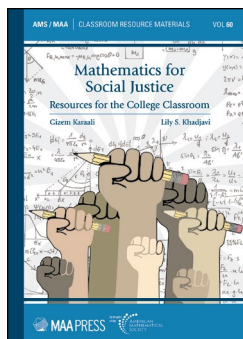
[Mathematics for Social Justice: Resources for the College Classroom and Focusing on Quantitative Reasoning and Statistics (2-Volume Set)](#)

Gizem Karaali, *Pomona College, Claremont, CA*, and **Lily Khadjavi**, *Loyola Marymount University, Los Angeles, CA*, Editors
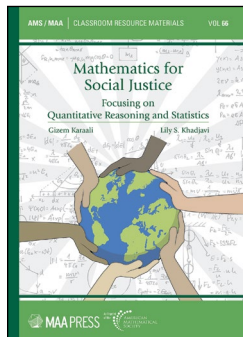
Mathematics for Social Justice: Resources for the College Classroom begins with a series of essays from instructors experienced in integrating social justice themes into their pedagogy; these essays contain political and pedagogical motivations as well as nuts-and-bolts teaching advice. The heart of the book is a collection of fourteen classroom-tested modules featuring ready-to-use activities and investigations for the college mathematics classroom.

Mathematics for Social Justice: Focusing on Quantitative Reasoning and Statistics comprises seventeen classroom-tested modules featuring ready-to-use activities and investigations for college mathematics and statistics courses. The modules empower students to study issues of social justice and to see the power and limitations of mathematics in real-world contexts of deep concern. The primary focus is on classroom activities where students can ask their own questions, find and analyze real data, apply mathematical ideas themselves, and draw their own conclusions.

Classroom Resource Materials

Volume 1: 2019; 277 pp.; softcover; ISBN: 978-1-4704-4926-1; List US$55; AMS members US$41.25; MAA members US$41.25; Order code: CLRM/60

Volume 2: 2021; 287 pp.; softcover; ISBN: 978-1-4704-4927-8; List US$60; AMS member US$45; MAA members US$45; Order code: CLRM/66

Set: 2021; 564 pp.; softcover; ISBN: 978-1-4704-6917-7; List US$99; AMS members US$74.25; MAA members US$74.25; Order code: CLRM-KARAALI-SET
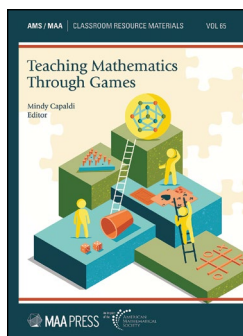
[Teaching Mathematics Through Games](#)

**Mindy Capaldi**, *Valparaiso University, IN*, Editor

Active engagement is the key to learning. You want your students doing something that stimulates them to ask questions and creates a need to know. *Teaching Mathematics Through Games* presents a variety of classroom-tested exercises and activities that provoke the active learning and curiosity that you hope to promote in your college mathematics courses.

Classroom Resource Materials, Volume 65

2021; 160 pp.; softcover; ISBN: 978-1-4704-6284-0; List US$60; AMS members US$48; MAA members US$45; Order code: CLRM/65

Carus Mathematical Monographs
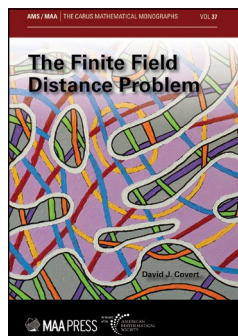
[The Finite Field Distance Problem](#)

David J. Covert, *University of Missouri, St. Louis, MO*

Erdős asked how many distinct distances must there be in a set of n points in the plane. Falconer asked a continuous analogue, essentially asking what is the minimal Hausdorff dimension required of a compact set in order to guarantee that the set of distinct distances has positive Lebesgue measure in R. The finite field distance problem poses the analogous question in a vector space over a finite field. The problem is relatively new but remains tantalizingly out of reach. This book provides an accessible, exciting summary of known results. The tools used range over combinatorics, number theory, analysis, and algebra.

Carus Mathematical Monographs, Volume 37

2021; 181 pp.; softcover; ISBN: 978-1-4704-6031-0; List US$65; AMS members US$48.75; MAA members US$48.75; Order code: CAR/37
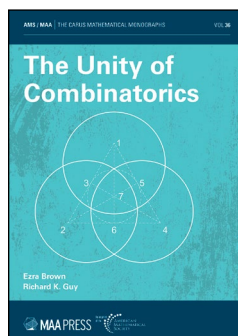
[The Unity of Combinatorics](#)

Ezra Brown, *Virginia Polytechnic Institute and State University, Blacksburg, VA*, and **Richard K. Guy**, *University of Calgary, AB, Canada*

Combinatorics, or the art and science of counting, is a vibrant and active area of pure mathematical research with many applications. The *Unity of Combinatorics* succeeds in showing that the many facets of combinatorics are not merely isolated instances of clever tricks but that they have numerous connections and threads weaving them together to form a beautifully patterned tapestry of ideas.

Carus Mathematical Monographs, Volume 36

2020; 353 pp.; softcover; ISBN: 978-1-4704-6509-4; List US$65; AMS members US$48.75; MAA members US$48.75; Order code: CAR/36.S

Spectrum
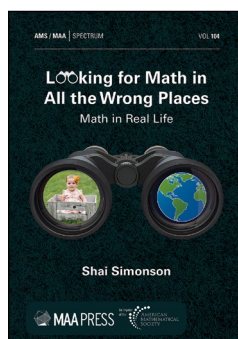
[Looking for Math in All the Wrong Places](#)

[Math in Real Life](#)

Shai Simonson, *Stonehill College, North Easton, MA*

The soul of mathematics is the practice of skeptical inquiry: asking how and why things work, experimenting, exploring, and discovering. Estimation, analysis, computation,

conjecture, and proof are the mathematical paths to uncovering truth, and we can use them in nearly every human pursuit. In this thoroughly charming and beguiling book, Shai Simonson applies mathematical tools in a variety of contexts that arise in everyday life to prove his claim that math is, literally, everywhere. Simonson applies his mathematical cast of mind to hiking, birthday parties, carnival games, lock picking, and kite flying. We see unexpected depths and connections when we look in the "wrong" places in the right way.

Spectrum, Volume 104

2022; 209 pp.; softcover; ISBN: 978-1-4704-7012-8; List US$35; AMS members US$26.25; MAA members US$26.25; Order code: SPEC/104
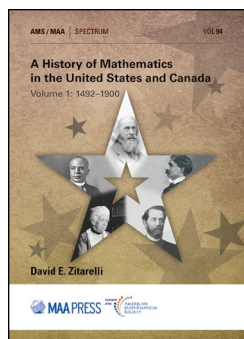
A History of Mathematics in the United States and Canada: Volumes 1 and 2

David E. Zitarelli, *Temple University, Philadelphia, PA,* **Della Dumbaugh**, *University of Richmond, Richmond, PA,* **Stephen F. Kennedy**, *Carleton College, Northfield, MN and MAA Press, Providence, RI*
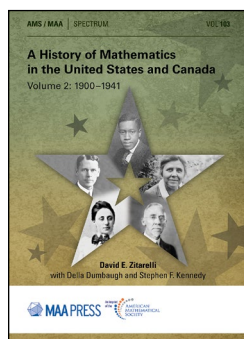
This is the first truly comprehensive and thorough history of the development of mathematics and a mathematical community in the United States and Canada.

David Zitarelli was emeritus Professor of Mathematics at Temple University. A decorated and acclaimed teacher, scholar, and expositor, he was one of the world's leading experts on the development of American mathematics. Author or co-author of over a dozen books, this was his *magnum opus*—sure to become the leading reference on the topic and essential reading, not just for historians. In clear and compelling prose, Zitarelli spins a tale accessible to experts, generalists, and anyone interested in the history of science in North America.

In the preface to the first volume of this work, Zitarelli reveals his animating philosophy, "I find that the human factor lends life and vitality to any subject." History of mathematics, in the Zitarelli conception, is not just a collection of abstract ideas and their development. It is a community of people and practices joining together to understand, perpetuate, and advance those ideas and each other. Telling the story of mathematics means telling the stories of these people: their accomplishments and triumphs; the institutions and structures they built; their interpersonal and scientific interactions; and their failures and shortcomings.

To order individual parts/volumes or the complete set, please specify the relevant order code.

Spectrum

Volume 1: 2019; 474 pp.; softcover; ISBN: 978-1-4704-7257-3; List US$120; AMS

members US$90; MAA members US$90; Order code: SPEC/94.S

Volume 2: 2022; 546 pp.; softcover; ISBN: 978-1-4704-6730-2; List US$120; AMS members US$90; MAA members US$90; Order code: SPEC/103

Set: 2022; 1020 pp.; softcover; ISBN: 978-1-4704-7264-1; List US$199; AMS members US$149.25; MAA members US$149.25; Order code: SPEC-ZITARELLI-SET
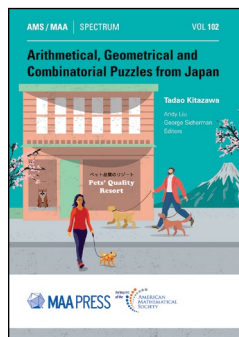
Arithmetical, Geometrical and Combinatorial Puzzles from Japan

Tadao Kitazawa, *Nagano, Japan*

Edited by Andy Liu, Edmonton, Canada, and George Sicherman, Red Bank, NJ

This book is the first collection of original puzzles by Tadao Kitazawa, a prominent Japanese puzzle-maker. These puzzles, which feature arithmetic, geometry, and combinatorics, are novel, creative, and require almost no formal mathematical knowledge. Kitazawa is particularly skillful in subtly modifying existing ideas to explore their potential to the full. For one example, a Tower Square is a Sudoku-like grid, but each row and column contains one 1, two 2s, three 3s, etc. The resulting transformation of the familiar problem is magical, and it is one of a variety of gems in this book. The common denominator is fun!

Spectrum, Volume 102

2021; 184 pp.; softcover; ISBN: 978-1-4704-6736-4; List US$35; AMS members US$26.25; MAA members US$26.25; Order code: SPEC/102
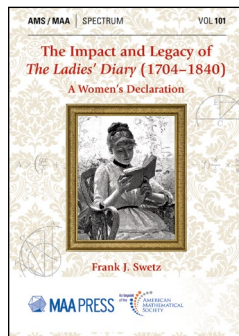
## The Impact and Legacy of The Ladies' Diary (1704–1840)

A Women's Declaration

Frank J. Swetz, *Pennsylvania State University, Middletown, PA*

The Ladies' Diary was an annual almanac published in England from 1704 to 1840. It was designed to provide useful information to women; the subtitle reveals the purpose, Containing New Improvements in Arts and Sciences, and Many Entertaining Particulars: Designed for the Use and Diversion of the Fair Sex. It contained meteorological and astronomical information, recipes, health and medical advice, scientific information, and mathematical puzzles and problems. Readers were encouraged to, and did, send solutions and original problems and puzzles of their own for publication in the next year's issue. In this volume, the author unearths the story of the *Diary's* creation and of the community of people surrounding it.

Spectrum, Volume 101

2021; 169 pp.; softcover; ISBN: 978-1-4704-6266-6; List US$55; AMS members US$41.25; MAA members US$41.25; Order code: SPEC/101
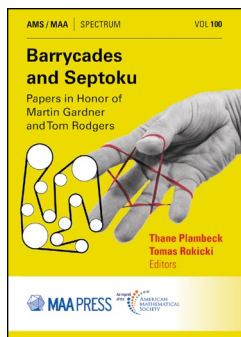
Barrycades and Septoku

Papers in Honor of Martin Gardner and Tom Rodgers

Thane Plambeck, *Counterwave, Inc., Palo Alto, CA* and **Tomas Rokicki**, Editors

The Gathering 4 Gardner is a biannual conference founded—and for many years organized—by Tom Rodgers to celebrate the spirit of Martin Gardner. This volume, a tribute to Rodgers and Gardner, consists of papers originally presented at the Gathering 4 Gardner meetings.

Spectrum, Volume 100

2020; 234 pp.; softcover; ISBN: 978-1-4704-4870-7; List US$65; AMS members US$48.75; MAA members US$48.75; Order code: SPEC/100

Dolciani Mathematical Expositions
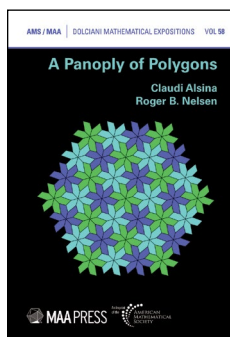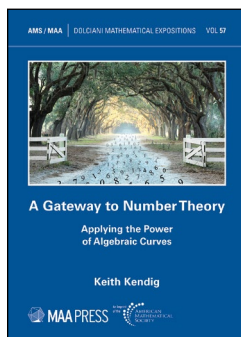
A Panoply of Polygons

Claudi Alsina, *Universitat Politècnica de Catalunya, Barcelona, Spain* and **Roger B. Nelsen**, *Lewis & Clark College, Portland, OR*

This is a book that presents and organizes hundreds of interesting results about polygons with more than four sides. Polygonal basics, pentagons, hexagons, heptagons, octagons, many-sided polygons, miscellaneous classes of polygons, and polygonal numbers are covered across eight chapters. Included are real-life examples, applications, and uses in art and architecture, as well as visual proofs.

Dolciani Mathematical Expositions, Volume 58

2023; 267 pp.; hardcover; ISBN:978-1-4704-7184-2; List US$65; AMS members US$48.75; MAA members US$48.75; Order code: DOL/58

A Gateway to Number Theory

Applying the Power of Algebraic Curves

Keith Kendig, *Cleveland State University, OH*

Find all integers a, b, c satisfying $2a^2 + 3b^2 = 5c^2$. A major advance in number theory means this book can give an easy answer to this and countless similar questions.

Dolciani Mathematical Expositions, Volume 57

2021; 207 pp.; softcover; ISBN: 978-1-4704-5622-1; List US$59; AMS members US$44.25; MAA members US$44.25; Order code: DOL/57
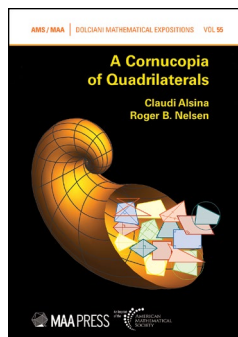
A Cornucopia of Quadrilaterals

Claudi Alsina, *Universitat Politècnica de Catalunya, Barcelona, Spain*, and **Roger B. Nelsen**, *Lewis & Clark College, Portland, OR*

A Cornucopia of Quadrilaterals collects and organizes hundreds of beautiful and surprising results about four-sided figures. There are results dating back to Euclid: the side-lengths of a pentagon, a hexagon, and a decagon inscribed in a circle can be assembled into a right triangle (the proof uses a quadrilateral and circumscribing circle); and results dating to Erdős: from any point in a triangle the sum of the distances to the vertices is at least twice as large as the sum of the distances to the sides.

Dolciani Mathematical Expositions, Volume 55

2020; 304 pp.; hardcover; ISBN: 978-1-4704-5312-1; List US$59; AMS members US$44.25; MAA members US$44.25; Order code: DOL/55

Anneli Lax New Mathematical Library
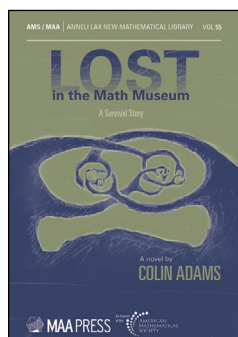
Lost in the Math Museum

A Survival Story

Colin Adams, *Williams College, Williamstown, MA*

From the twisted imagination of best-selling author Colin Adams *(Zombies & Calculus, The Knot Book)* comes this tale of sixteen-year-old Kallie trying to escape death at the hands of the exhibits in a mathematics museum. Kallie crosses paths with Carl Gauss, Bertrand Russell, Sophie Germain, G. H. Hardy, and John von Neumann, as she tries to save herself, her dad, and his colleague Maria from the deadly Hairy Ball theorem, the harrowing Hilbert Hotel, the bisecting Ham Sandwich machine, and a variety of other mathematical menaces. It's a wild romp through a mathematical bestiary featuring the bizarre, the exotic, and the counterintuitive. You'll never think of math the same way again.

Anneli Lax New Mathematical Library, Volume 55

2022; 209 pp.; softcover; ISBN: 978-1-4704-6858-3; List US$35; AMS members US$26.25; MAA members US$26.25; Order code: NML/55
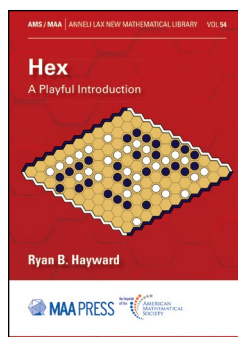
Hex

A Playful Introduction

Ryan B. Hayward, *University of Alberta, Edmonton, AB, Canada*

This book offers a gentle introduction to Hex, the classic board game created by Piet Hein and popularized by John Nash and Martin Gardner.
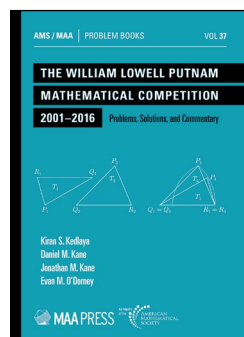
Did we mention puzzles? There are puzzles in every chapter with solutions.

This book is intended for anyone interested in playing board games or learning some recreational mathematics. It is written for a wide audience and will be enjoyed equally by general readers and professional mathematicians. The book could be used as a textbook or companion resource for a topics course on recreational mathematics or game theory or as a source for undergraduate research questions.

Problem Books

The William Lowell Putnam Mathematical Competition 2001–2016

Problems, Solutions, and Commentary

Kiran S. Kedlaya, *University of California, San Diego, La Jolla, CA,* **Daniel M. Kane**, *University of California, San Diego, La Jolla, CA,* **Jonathan M. Kane**, *University of Wisconsin-Madison, WI,* and **Evan M. O'Dorney**, *Princeton University, NJ*

The William Lowell Putnam Mathematics Competition is the most prestigious undergraduate mathematics problem-solving contest in North America, with thousands of students taking part every year. This volume presents the contest problems for the years 2001–2016. The heart of the book is the solutions; these include multiple approaches, drawn from many sources, plus insights into navigating from the problem statement to a solution. There is also a section of hints to encourage readers to engage deeply with the problems before consulting the solutions.

"The hints and solutions here are the work of the four authors of the book, who are masters of the art of Putnam problem solving. The hints are short but just right, neither too much nor too little. The solutions are beautifully written." —David H. Ullman, George Washington University
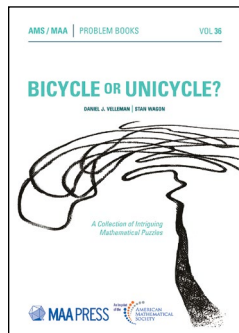
Bicycle or Unicycle?

A Collection of Intriguing Mathematical Puzzles

Daniel J. Velleman, *Amherst College, MA, and University of Vermont, Burlington, VT,* and **Stan Wagon**, *Macalester College, St. Paul, MN*

Bicycle or Unicycle? is a collection of 105 mathematical puzzles whose defining characteristic is the surprise encountered in their solutions. These problems were selected from the Macalester College Problem of the Week archive. The Macalester tradition of a weekly problem was started by Joseph Konhauser in 1968. In 1993, Stan Wagon assumed problem-generating duties.

The problems unfold into levels of depth and generality very unusual in the types of problems seen in contests. In contrast to contest problems, these are problems meant to be savored.

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