

Maa American Mathematics Competitions 2017 Amc 10 12

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,

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to encourage readers to engage deeply with the problems before consulting the solutions. The authors have a distinguished history of engagement with, and preparation of students for, the Putnam and other mathematical competitions. Collectively they have been named Putnam Fellow (top five finisher) ten times. Kiran Kedlaya also maintains the online Putnam Archive. A concise and self-contained introduction to causal inference, increasingly important in data science and machine learning. The mathematization of causality is a relatively recent development, and has become increasingly important in data science and machine learning. This book offers a self-contained and concise

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introduction to causal models and how to learn them from data. After explaining the need for causal models and discussing some of the principles underlying causal inference, the book teaches readers how to use causal models: how to compute intervention distributions, how to infer causal models from observational and interventional data, and how causal ideas could be exploited for classical machine learning problems. All of these topics are discussed first in terms of two variables and then in the more general multivariate case. The bivariate case turns out to be a particularly hard problem for causal learning because there are no conditional independences as used by classical methods

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for solving multivariate cases. The authors consider analyzing statistical asymmetries between cause and effect to be highly instructive, and they report on their decade of intensive research into this problem. The book is accessible to readers with a background in machine learning or statistics, and can be used in graduate courses or as a reference for researchers. The text includes code snippets that can be copied and pasted, exercises, and an appendix with a summary of the most important technical concepts.

"The ancient Greeks argued that the best life was filled with beauty, truth, justice, play and love. The mathematician Francis Su knows just where to find

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them."--Kevin Hartnett, Quanta Magazine" This is perhaps the most important mathematics book of our time. Francis Su shows mathematics is an experience of the mind and, most important, of the heart."--James Tanton, Global Math Project For mathematician Francis Su, a society without mathematical affection is like a city without concerts, parks, or museums. To miss out on mathematics is to live without experiencing some of humanity's most beautiful ideas. In this profound book, written for a wide audience but especially for those disenchanted by their past experiences, an award-winning mathematician and educator weaves parables, puzzles, and personal reflections to show how

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mathematics meets basic human desires--such as for play, beauty, freedom, justice, and love--and cultivates virtues essential for human flourishing. These desires and virtues, and the stories told here, reveal how mathematics is intimately tied to being human. Some lessons emerge from those who have struggled, including philosopher Simone Weil, whose own mathematical contributions were overshadowed by her brother's, and Christopher Jackson, who discovered mathematics as an inmate in a federal prison. Christopher's letters to the author appear throughout the book and show how this intellectual pursuit can--and must--be open to all.

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At the turn of the twentieth century, mathematical scholarship in the United States underwent a stunning transformation. In 1890 no American professor was producing mathematical research worthy of international attention. Graduate students were then advised to pursue their studies abroad. By the start of World War I the standing of American mathematics had radically changed. George David Birkhoff, Leonard Dickson, and others were turning out cutting edge investigations that attracted notice in the intellectual centers of Europe. Harvard, Chicago, and Princeton maintained graduate programs comparable to those overseas. This book explores the people, timing, and

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factors behind this rapid advance. Through the mid-nineteenth century most American colleges followed a classical curriculum that, in mathematics, rarely reached beyond calculus. With no doctoral programs of any sort in the United States until 1860, mathematical scholarship lagged far behind that in Europe. After the Civil War, visionary presidents at Harvard and Johns Hopkins broadened and deepened the opportunities for study. The breakthrough for mathematics began in 1890 with the hiring, in consecutive years, of William F. Osgood and Maxime Bôcher at Harvard and E. H. Moore at Chicago. Each of these young men had studied in Germany where they acquired vital mathematical

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knowledge and taste. Over the next few years Osgood, Bôcher, and Moore established their own research programs and introduced new graduate courses. Working with other like-minded individuals through the nascent American Mathematical Society, the infrastructure of meetings and journals were created. In the early twentieth century Princeton dramatically upgraded its faculty to give the United States the stability of a third mathematics center. The publication by Birkhoff, in 1913, of the solution to a famous conjecture served notice that American mathematics had earned consideration with the European powers of Germany, France, Italy, England, and Russia.

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The Art of Failure

The Problems They Solved, Why These Are Important,
and What You Should Know about Them

The Role of Advection in a Two-Species Competition
Model: A Bifurcation Approach

Living Proof

Bernoulli's Fallacy

The Best Writing on Mathematics 2018

*The year's finest mathematical writing from around the world
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 2018 makes*

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available to a wide audience many pieces not easily found anywhere else—and you don't need to be a mathematician to enjoy them. These essays delve into the history, philosophy, teaching, and everyday aspects of math, offering surprising insights into its nature, meaning, and practice—and taking readers behind the scenes of today's hottest mathematical debates. James Grime shows how to build subtly mischievous dice for playing slightly unfair games and Michael Barany traces how our appreciation of the societal importance of mathematics has developed since World War II. In other essays, Francis Su extolls the inherent values of learning, doing, and sharing mathematics, and Margaret Wertheim takes us on a mathematical exploration of the mind and the world—with glimpses at science, philosophy, music,

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art, and even crocheting. And there's much, much more. In addition to presenting the year's most memorable math writing, this must-have anthology includes an introduction by the editor and a bibliography of other notable pieces on mathematics. This is a must-read for anyone interested in where math has taken us—and where it is headed.

Challenge your problem-solving aptitude in number theory with powerful problems that have concrete examples which reflect the potential and impact of theoretical results. Each chapter focuses on a fundamental concept or result, reinforced by each of the subsections, with scores of challenging problems that allow you to comprehend number theory like never before. All students and coaches wishing to excel in math competitions will benefit from this book as will

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mathematicians and adults who enjoy interesting mathematics.

The Putnam Competition has since 1928 been providing a challenge to gifted college mathematics students. This book, the second of the Putnam Competition volumes, contains problems with their solutions for the years 1965-1984.

Additional solutions are presented for many of the problems. Included is an essay on recollections of the first Putnam Exam by Herbert Robbins, as well as appendices listing the winning teams and students from 1965 through 1984. This volume offers the problem solver an enticing sample of challenging problems and their solutions. In 1980, the MAA published the first William Lowell Putnam Mathematical Competition book, covering the contest from 1938 to 1964. In

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2002 the third of the Putnam problem books appeared, covering the years 1985 through 2000. All three of these books belong on the bookshelf of students, teachers, and all interested in problem solving.

The book presents the winners of the Abel Prize in mathematics for the period 2013–17: Pierre Deligne (2013); Yakov G. Sinai (2014); John Nash Jr. and Louis Nirenberg (2015); Sir Andrew Wiles (2016); and Yves Meyer (2017). The profiles feature autobiographical information as well as a scholarly description of each mathematician's work. In addition, each profile contains a Curriculum Vitae, a complete bibliography, and the full citation from the prize committee. The book also includes photos for the period 2003–2017 showing many of the additional activities connected with the

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Abel Prize. As an added feature, video interviews with the Laureates as well as videos from the prize ceremony are provided at an accompanying website

*(<http://extras.springer.com/>). This book follows on *The Abel Prize: 2003-2007. The First Five Years* (Springer, 2010) and *The Abel Prize 2008-2012* (Springer 2014), which profile the work of the previous Abel Prize winners.*

*Testimonios: Stories of Latinx and Hispanic Mathematicians
American Mathematics 1890-1913*

*An Engaging Introduction to Proof
Advanced Calculus on the Real Axis*

Number Theory

Problems in Real Analysis

An exploration of why we play video games despite the fact

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that we are almost certain to feel unhappy when we fail at them. We may think of video games as being "fun," but in The Art of Failure, Jesper Juul claims that this is almost entirely mistaken. When we play video games, our facial expressions are rarely those of happiness or bliss. Instead, we frown, grimace, and shout in frustration as we lose, or die, or fail to advance to the next level. Humans may have a fundamental desire to succeed and feel competent, but game players choose to engage in an activity in which they are nearly certain to fail and feel incompetent. So why do we play video games even though they make us unhappy? Juul examines this paradox. In video games, as in tragic works of art, literature, theater, and cinema, it seems that we want to experience unpleasantness even if we also

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dislike it. Reader or audience reaction to tragedy is often explained as catharsis, as a purging of negative emotions. But, Juul points out, this doesn't seem to be the case for video game players. Games do not purge us of unpleasant emotions; they produce them in the first place. What, then, does failure in video game playing do? Juul argues that failure in a game is unique in that when you fail in a game, you (not a character) are in some way inadequate. Yet games also motivate us to play more, in order to escape that inadequacy, and the feeling of escaping failure (often by improving skills) is a central enjoyment of games. Games, writes Juul, are the art of failure: the singular art form that sets us up for failure and allows us to experience it and experiment with it. The Art of Failure is essential

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reading for anyone interested in video games, whether as entertainment, art, or education.

Ten years from now, what do you want or expect your students to remember from your course? We realized that in ten years what matters will be how students approach a problem using the tools they carry with them—common sense and common knowledge—not the particular mathematics we chose for the curriculum. 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

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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.

This book is a comprehensive compilation of all the problems and solutions from the 2003 to 2012 Purple Comet Math Meet contests for middle and high school students. The problems featured not only employ an extensive range

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of mathematical concepts from algebra, geometry, number theory, and combinatorics but also encourage team collaboration. Any student interested in mathematics--whether looking to prepare for contests or, even more importantly, to sharpen math problem-solving skills--would cherish and enjoy this unique and pertinent collection of meaningful problems and solutions. Building bridges between classical results and contemporary nonstandard problems, this highly relevant work embraces important topics in analysis and algebra from a problem-solving perspective. The book is structured to assist the reader in formulating and proving conjectures, as well as devising solutions to important mathematical problems by making connections between various concepts

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and ideas from different areas of mathematics. Instructors and motivated mathematics students from high school juniors to college seniors will find the work a useful resource in calculus, linear and abstract algebra, analysis and differential equations. Students with an interest in mathematics competitions must have this book in their personal libraries.

*Hybrid Soft Computing Models Applied to Graph Theory
An Essay on the Pain of Playing Video Games*

Purple Comet! Math Meet

*Research Handbook on the Law of Artificial Intelligence
Concepts and Problems*

Statistical Illogic and the Crisis of Modern Science

The field of artificial intelligence (AI) has made

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tremendous advances in the last two decades, but as smart as AI is now, it is getting smarter and becoming more autonomous. This raises a host of challenges to current legal doctrine, including whether AI/algorithms should count as 'speech', whether AI should be regulated under antitrust and criminal law statutes, and whether AI should be considered as an agent under agency law or be held responsible for injuries under tort law. This book contains chapters from US and international law scholars on the role of law in an age of increasingly smart AI, addressing these and other issues that are

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critical to the evolution of the field.

This is a challenging problem-solving book in Euclidean geometry, assuming nothing of the reader other than a good deal of courage. Topics covered included cyclic quadrilaterals, power of a point, homothety, triangle centers; along the way the reader will meet such classical gems as the nine-point circle, the Simson line, the symmedian and the mixtilinear incircle, as well as the theorems of Euler, Ceva, Menelaus, and Pascal. Another part is dedicated to the use of complex numbers and barycentric coordinates, granting the reader both a

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traditional and computational viewpoint of the material. The final part consists of some more advanced topics, such as inversion in the plane, the cross ratio and projective transformations, and the theory of the complete quadrilateral. The exposition is friendly and relaxed, and accompanied by over 300 beautifully drawn figures. The emphasis of this book is placed squarely on the problems. Each chapter contains carefully chosen worked examples, which explain not only the solutions to the problems but also describe in close detail how one would invent the solution to begin with. The text contains a

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selection of 300 practice problems of varying difficulty from contests around the world, with extensive hints and selected solutions. This book is especially suitable for students preparing for national or international mathematical olympiads or for teachers looking for a text for an honor class.

The Handbook of Research on STEM Education represents a groundbreaking and comprehensive synthesis of research and presentation of policy within the realm of science, technology, engineering, and mathematics (STEM) education. What distinguishes this Handbook from others is the

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nature of integration of the disciplines that is the founding premise for the work – all chapters in this book speak directly to the integration of STEM, rather than discussion of research within the individual content areas. The Handbook of Research on STEM Education explores the most pressing areas of STEM within an international context. Divided into six sections, the authors cover topics including: the nature of STEM, STEM learning, STEM pedagogy, curriculum and assessment, critical issues in STEM, STEM teacher education, and STEM policy and reform. The Handbook utilizes

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the lens of equity and access by focusing on STEM literacy, early childhood STEM, learners with disabilities, informal STEM, socio-scientific issues, race-related factors, gender equity, cultural-relevancy, and parental involvement. Additionally, discussion of STEM education policy in a variety of countries is included, as well as a focus on engaging business/industry and teachers in advocacy for STEM education. The Handbook's 37 chapters provide a deep and meaningful landscape of the implementation of STEM over the past two decades. As such, the findings that are presented within

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provide the reader with clear directions for future research into effective practice and supports for integrated STEM, which are grounded in the literature to date.

This guide covers the story of trigonometry. It is a swift overview, but it is complete in the context of the content discussed in beginning and advanced high-school courses. The purpose of these notes is to supplement and put into perspective the material of any course on the subject you may have taken or are currently taking. (These notes will be tough going for those encountering trigonometry for the very first

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time!)

Adventures in the Math Zone

Exploring Mathematics

Trigonometry

Lessons from Hong Kong

The William Lowell Putnam Mathematical

Competition 2001–2016: Problems, Solutions, and
Commentary

Elements of Causal Inference

**The advancement of the knowledge frontier
is crucial for technological innovation
and human progress. Using novel data from**

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the setting of mathematics, this paper establishes two results. First, we document that individuals who demonstrate exceptional talent in their teenage years have an irreplaceable ability to create new ideas over their lifetime, suggesting that talent is a central ingredient in the production of knowledge. Second, such talented individuals born in low- or middle-income countries are systematically less likely to become knowledge producers. Our findings suggest that policies to encourage exceptionally-talented youth to

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pursue scientific careers—especially those from lower income countries—could accelerate the advancement of the knowledge frontier.

Wow! This is a powerful book that addresses a long-standing elephant in the mathematics room. Many people learning math ask ``Why is math so hard for me while everyone else understands it?'' and ``Am I good enough to succeed in math?'' In answering these questions the book shares personal stories from many now-accomplished mathematicians affirming that

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``You are not alone; math is hard for everyone'' and ``Yes; you are good enough.'' Along the way the book addresses other issues such as biases and prejudices that mathematicians encounter, and it provides inspiration and emotional support for mathematicians ranging from the experienced professor to the struggling mathematics student. --Michael Dorff, MAA President This book is a remarkable collection of personal reflections on what it means to be, and to become, a mathematician. Each story reveals a unique

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and refreshing understanding of the barriers erected by our cultural focus on 'math is hard.' Indeed, mathematics is hard, and so are many other things--as Stephen Kennedy points out in his cogent introduction. This collection of essays offers inspiration to students of mathematics and to mathematicians at every career stage. --Jill Pipher, AMS President
This book is published in cooperation with the Mathematical Association of America. This groundbreaking anthology is a collection of accounts from leaders in

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mathematical outreach initiatives. The experiences range from prison education programs to alternative urban and Indian reservation classrooms across the United States, traversing the planet from the Americas to Africa, Asia, and the Indian subcontinent. Their common theme is the need to share meaningful and beautiful mathematics with disenfranchised communities across the globe. Through these stories, the authors share their educational philosophy, personal experiences, and student outcomes. They

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incorporate anecdotal vignettes since research articles in mathematics education often exclude them. The inclusion of these stories is an element that adds immeasurable value to the larger narratives they tell.

Exploring Mathematics gives students experience with doing mathematics - interrogating mathematical claims, exploring definitions, forming conjectures, attempting proofs, and presenting results - and engages them with examples, exercises, and projects that

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pique their interest. Written with a minimal number of pre-requisites, this text can be used by college students in their first and second years of study, and by independent readers who want an accessible introduction to theoretical mathematics. Core topics include proof techniques, sets, functions, relations, and cardinality, with selected additional topics that provide many possibilities for further exploration. With a problem-based approach to investigating the material, students develop interesting examples and

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theorems through numerous exercises and projects. In-text exercises, with complete solutions or robust hints included in an appendix, help students explore and master the topics being presented. The end-of-chapter exercises and projects provide students with opportunities to confirm their understanding of core material, learn new concepts, and develop mathematical creativity.

Stories of Resilience Along the
Mathematical Journey
Putnam and Beyond

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A Clever Study Guide

Quantitative Literacy

Problems, Solutions and Commentary

Euclidean Geometry in Mathematical
Olympiads

Testimonios brings together first-person narratives from the vibrant, diverse, and complex Latinx and Hispanic mathematical community. Starting with childhood and family, the authors recount their own individual stories, highlighting their upbringing, education, and career paths. Their particular stories, told in their own voices, from their own perspectives, give visibility to

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some of the experiences of Latinx/Hispanic mathematicians. Testimonios seeks to inspire the next generation of Latinx and Hispanic mathematicians by featuring the stories of people like them, holding a mirror up to our own community. It also 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.

A TeXas Style Introduction to Proof is an IBL textbook designed for a one-semester course on proofs (the “bridge course”) that also introduces

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TeX as a tool students can use to communicate their work. As befitting “textless” text, the book is, as one reviewer characterized it, “minimal.” Written in an easy-going style, the exposition is just enough to support the activities, and it is clear, concise, and effective. The book is well organized and contains ample carefully selected exercises that are varied, interesting, and probing, without being discouragingly difficult. The effects of weak and strong advection on the dynamics of reaction-diffusion models have long been studied. In contrast, the role of intermediate advection remains poorly

understood. For example, concentration phenomena can occur when advection is strong, providing a mechanism for the coexistence of multiple populations, in contrast with the situation of weak advection where coexistence may not be possible. The transition of the dynamics from weak to strong advection is generally difficult to determine. In this work the authors consider a mathematical model of two competing populations in a spatially varying but temporally constant environment, where both species have the same population dynamics but different dispersal strategies: one species adopts

random dispersal, while the dispersal strategy for the other species is a combination of random dispersal and advection upward along the resource gradient. For any given diffusion rates the authors consider the bifurcation diagram of positive steady states by using the advection rate as the bifurcation parameter. This approach enables the authors to capture the change of dynamics from weak advection to strong advection. The authors determine three different types of bifurcation diagrams, depending on the difference of diffusion rates. Some exact multiplicity results about bifurcation points are

also presented. The authors' results can unify some previous work and, as a case study about the role of advection, also contribute to the understanding of intermediate (relative to diffusion) advection in reaction-diffusion models. This book describes a set of hybrid fuzzy models showing how to use them to deal with incomplete and/or vague information in different kind of decision-making problems. Based on the authors' research, it offers a concise introduction to important models, ranging from rough fuzzy digraphs and intuitionistic fuzzy rough models to bipolar fuzzy soft graphs and neutrosophic

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graphs, explaining how to construct them. For each method, applications to different multi-attribute, multi-criteria decision-making problems, are presented and discussed. The book, which addresses computer scientists, mathematicians, and social scientists, is intended as concise yet complete guide to basic tools for constructing hybrid intelligent models for dealing with some interesting real-world problems. It is also expected to stimulate readers' creativity thus offering a source of inspiration for future research.

Why Numeracy Matters for Schools and Colleges

***Invisible Geniuses: Could the Knowledge Frontier
Advance Faster?***

***A TeXas Style Introduction to Proof
Math Trek***

***Supplementary Activities and Writing Projects
Discovering Discrete Dynamical Systems***

There is a logical flaw in the statistical methods used across experimental science. This fault is not a minor academic quibble: it underlies a reproducibility crisis now threatening entire disciplines. In an increasingly statistics-reliant society, this same deeply rooted error shapes decisions in medicine,

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law, and public policy with profound consequences. The foundation of the problem is a misunderstanding of probability and its role in making inferences from observations. Aubrey Clayton traces the history of how statistics went astray, beginning with the groundbreaking work of the seventeenth-century mathematician Jacob Bernoulli and winding through gambling, astronomy, and genetics. Clayton recounts the feuds among rival schools of statistics, exploring the surprisingly human problems that gave rise to the discipline and the all-too-human shortcomings that derailed it. He highlights how

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influential nineteenth- and twentieth-century figures developed a statistical methodology they claimed was purely objective in order to silence critics of their political agendas, including eugenics. Clayton provides a clear account of the mathematics and logic of probability, conveying complex concepts accessibly for readers interested in the statistical methods that frame our understanding of the world. He contends that we need to take a Bayesian approach—that is, to incorporate prior knowledge when reasoning with incomplete information—in order to resolve the crisis. Ranging across math,

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philosophy, and culture, Bernoulli's Fallacy explains why something has gone wrong with how we use data—and how to fix it.

Longlisted for the National Book Award New York Times Bestseller A former Wall Street quant sounds an alarm on the mathematical models that pervade modern life -- and threaten to rip apart our social fabric We live in the age of the algorithm.

Increasingly, the decisions that affect our lives--where we go to school, whether we get a car loan, how much we pay for health insurance--are being made not by humans, but by mathematical

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models. In theory, this should lead to greater fairness: Everyone is judged according to the same rules, and bias is eliminated. But as Cathy O'Neil reveals in this urgent and necessary book, the opposite is true. The models being used today are opaque, unregulated, and uncontestable, even when they're wrong. Most troubling, they reinforce discrimination: If a poor student can't get a loan because a lending model deems him too risky (by virtue of his zip code), he's then cut off from the kind of education that could pull him out of poverty, and a vicious spiral ensues. Models are propping up the

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lucky and punishing the downtrodden, creating a "toxic cocktail for democracy." Welcome to the dark side of Big Data. Tracing the arc of a person's life, O'Neil exposes the black box models that shape our future, both as individuals and as a society. These "weapons of math destruction" score teachers and students, sort resumes, grant (or deny) loans, evaluate workers, target voters, set parole, and monitor our health. O'Neil calls on modelers to take more responsibility for their algorithms and on policy makers to regulate their use. But in the end, it's up to us to become more savvy about the models that

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govern our lives. This important book empowers us to ask the tough questions, uncover the truth, and demand change. -- Longlist for National Book Award (Non-Fiction) -- Goodreads, semi-finalist for the 2016 Goodreads Choice Awards (Science and Technology) -- Kirkus, Best Books of 2016 -- New York Times, 100 Notable Books of 2016 (Non-Fiction) -- The Guardian, Best Books of 2016 -- WBUR's "On Point," Best Books of 2016: Staff Picks -- Boston Globe, Best Books of 2016, Non-Fiction

Problems in Real Analysis: Advanced Calculus on the Real Axis features a comprehensive collection of

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challenging problems in mathematical analysis that aim to promote creative, non-standard techniques for solving problems. This self-contained text offers a host of new mathematical tools and strategies which develop a connection between analysis and other mathematical disciplines, such as physics and engineering. A broad view of mathematics is presented throughout; the text is excellent for the classroom or self-study. It is intended for undergraduate and graduate students in mathematics, as well as for researchers engaged in the interplay between applied analysis, mathematical

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physics, and numerical analysis.

The William Lowell Putnam Mathematical Competition is the premier undergraduate mathematical competition in North America. This volume contains problems from the years 1985-2000, with solutions and extensive commentary. It is unlike the first two Putnam volumes and unlike virtually every other problem-based book, in that it places the problems in the context of important mathematical themes. The authors highlight connections to other problems, to the curriculum, and to more advanced topics. The

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best problems contain kernels of sophisticated ideas related to important current research, and yet the problems are accessible to undergraduates. The heart of the book is in the solutions, which have been compiled through extensive research. In editing the solutions, the authors have kept a student audience in mind, explaining techniques that have relevance to more than the problem at hand, suggesting references for further reading, and mentioning related problems, some of which are unsolved.

Problems and Solutions 1965-1984

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1938-1964

Handbook of Research on STEM Education
The First Ten Years

Exercises in (Mathematical) Style

Creating Change to Improve Science and
Mathematics Education

This book takes the reader on a journey through the world of college mathematics, focusing on some of the most important concepts and results in the theories of polynomials, linear algebra, real analysis, differential equations, coordinate geometry, trigonometry, elementary number theory, combinatorics, and probability. Preliminary material provides an overview of common methods of proof: argument by

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contradiction, mathematical induction, pigeonhole principle, ordered sets, and invariants. Each chapter systematically presents a single subject within which problems are clustered in each section according to the specific topic. The exposition is driven by nearly 1300 problems and examples chosen from numerous sources from around the world; many original contributions come from the authors. The source, author, and historical background are cited whenever possible. Complete solutions to all problems are given at the end of the book. This second edition includes new sections on quad ratic polynomials, curves in the plane, quadratic fields, combinatorics of numbers, and graph theory, and added problems or theoretical expansion of sections on polynomials, matrices, abstract algebra, limits of sequences and functions, derivatives and their applications,

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Stokes' theorem, analytical geometry, combinatorial geometry, and counting strategies. Using the W.L. Putnam Mathematical Competition for undergraduates as an inspiring symbol to build an appropriate math background for graduate studies in pure or applied mathematics, the reader is eased into transitioning from problem-solving at the high school level to the university and beyond, that is, to mathematical research. This work may be used as a study guide for the Putnam exam, as a text for many different problem-solving courses, and as a source of problems for standard courses in undergraduate mathematics. Putnam and Beyond is organized for independent study by undergraduate and graduate students, as well as teachers and researchers in the physical sciences who wish to expand their mathematical horizons.

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Washington Information Directory is this essential one-stop resource for information on U.S. governmental and nongovernmental agencies and organizations. This thoroughly researched guide provides capsule descriptions that help users quickly and easily find the right person at the right organizations. Washington Information Directory offers three easy ways to find information: by name, by organization, and through detailed subject indexes. It also includes dozens of resource boxes on particular topics and organization charts for federal agencies and NGOs. With more than 10,000 listings, the 2016-2017 edition of Washington Information Directory features concise organization descriptions and contact information for: Federal departments and agencies
Congressional members, committees, and organizations

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Nongovernmental and international organizations Courts and judiciary organization As well as contact information for: Governors and other state officials U.S. ambassadors and foreign diplomats Nearly 200 House and Senate caucuses

Discovering Discrete Dynamical Systems is a mathematics textbook designed for use in a student-led, inquiry-based course for advanced mathematics majors. Fourteen modules each with an opening exploration, a short exposition and related exercises and a concluding project guide students to self-discovery on topics such as fixed points and their classifications, chaos and fractals, Julia and Mandelbrot sets in the complex plane, and symbolic dynamics. Topics have been carefully chosen as a means for developing student persistence and skill in exploration, conjecture, and generalization while at the same

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time providing a coherent introduction to the fundamentals of discrete dynamical systems. This book is written for undergraduate students with the prerequisites for a first analysis course, and it can easily be used by any faculty member in a mathematics department, regardless of area of expertise. Each module starts with an exploration in which the students are asked an open-ended question. This allows the students to make discoveries which lead them to formulate the questions that will be addressed in the exposition and exercises of the module. The exposition is brief and has been written with the intent that a student who has taken, or is ready to take, a course in analysis can read the material independently. The exposition concludes with exercises which have been designed to both illustrate and explore in more depth the ideas covered in the

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exposition. Each module concludes with a project in which students bring the ideas from the module to bear on a more challenging or in-depth problem. A section entitled "To the Instructor" includes suggestions on how to structure a course order to realize the inquiry-based intent of the book. The book has also been used successfully as the basis for an independent study course and as a supplementary text for an analysis course with traditional content.

Sport is a wildly popular and accessible pastime that most students find interest in. The link between mathematics and sports - particularly between statistics and sports - is well known, but is rarely used as a method for sparking a real interest and better understanding of mathematics at university level. *Introductory Mathematics and Statistics through Sports*

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develops this connection, and uses sport as a tool to help students get to grips with mathematics and statistics. It contains valuable resources, such as activities and writing projects for use in quantitative reasoning or introductory statistics classrooms. These inquiry-based activities and open-ended writing projects are all set in the authentic framework of a sporting environment and are designed to promote critical thinking and mathematical application skills that students can apply outside of the classroom. All activities and projects have been classroom-tested and are ready to be implemented as they are, or can be easily personalized by instructors with a helpful run-down of successes and misunderstandings for each project. Introductory Mathematics and Statistics through Sports places great emphasis on the communication, application, and

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internalization of mathematics for students whose primary interests are not necessarily in STEM fields.

The William Lowell Putnam Mathematical Competition
1985-2000

Mathematics for Human Flourishing

Weapons of Math Destruction

Introductory Mathematics and Statistics through Sports

Common Sense Mathematics: Second Edition

This book discusses the merits and potential shortcomings of
Hong Kong STEM education from Grade 8 to Grade 12.

Based on concurrent triangulated mixed-method methodology,
which integrates both quantitative and qualitative procedures,
it describes various change models and proposes new models

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that are considered compatible with Western cultures.

Back by popular demand, the MAA is pleased to reissue this outstanding collection of problems and solutions from the Putnam Competitions covering the years 1938-1964.

Problemists the world over, including all past and future Putnam Competitors, will revel in mastering the difficulties posed by this collection of problems from the first 25 William Lowell Putnam Competitions.

There s a new amusement park in town. Come on in and find out allthe exciting ways you can have fun with math in everyday life. Wander through the fractal forest, take a ride on the M?obius-striproller coaster, and get dizzy learning about how math makes theTilt-A-Whirl possible. The more activities

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you try, the more you ll learn how cool it can be to see the world through the eyes of a mathematician. Once you ve sampled some of the interesting and unique projects in Math Trek, from untangling unknots to winning games with weird dice to figuring out secret codes, you ll see that every trip to the MathZone is an exciting adventure!

What does style mean in mathematics? Style is both how one does something and how one communicates what was done. In this book, the author investigates the worlds of the well-known numbers, the binomial coefficients. The author follows the example of Raymond Queneau's Exercises in Style. Offering the reader 99 stories in various styles. The book celebrates the joy of mathematics and the joy of writing mathematics by

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exploring the rich properties of this familiar collection of numbers. For any one interested in mathematics, from high school students on up.

Insights and Recommendations from the MAA National Study of College Calculus

The William Lowell Putnam Mathematical Competition
Problems and Solutions

The Abel Prize 2013-2017

Risk, Uncertainty and Profit

Mathematical Bridges

Washington Information Directory 2016-2017

DIV This enduring economics text provided the theoretical basis of the entrepreneurial American

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economy during the post-industrial era. A revolutionary work, it taught the world how to systematically distinguish between risk and uncertainty. /div

The original title for this work was “Mathematical Literacy, What Is It and Why You Need it”. The current title reflects that there can be no real learning in any subject, unless questions of who, what, when, where, why and how are raised in the minds of the learners. The book is not a mathematical text, and there are no assigned exercises or exams. It is written for reasonably intelligent and curious individuals, both those who value mathematics, aware of its many

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important applications and others who have been inappropriately exposed to mathematics, leading to indifference to the subject, fear and even loathing. These feelings are all consequences of meaningless presentations, drill, rote learning and being lost as the purpose of what is being studied. Mathematics education needs a radical reform. There is more than one way to accomplish this. Here the author presents his approach of wrapping mathematical ideas in a story. To learn one first must develop an interest in a problem and the curiosity to find how masters of mathematics have solved them. What is necessary to be mathematically literate? It's not about solving

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algebraic equations or even making a geometric proof. These are valuable skills but not evidence of literacy. We often seek answers but learning to ask pertinent questions is the road to mathematical literacy. Here is the good news: new mathematical ideas have a way of finding applications. This is known as “the unreasonable effectiveness of mathematics.”

*How Big Data Increases Inequality and Threatens
Democracy*

*The William Lowell Putnam Mathematical Competition
Foundations and Learning Algorithms*

Masters of Mathematics

Catching up to Europe

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*Mathematical Outreach: Explorations In Social Justice
Around The Globe*