

The Stanford Mathematics Problem Book With Hints And Solutions Dover Books On Mathematics

This book is intended for a one-year graduate course on Lie groups and Lie algebras. The book goes beyond the representation theory of compact Lie groups, which is the basis of many texts, and provides a carefully chosen range of material to give the student the bigger picture. The book is organized to allow different paths through the material depending on one's interests. This second edition has substantial new material, including improved discussions of underlying principles, streamlining of some proofs, and many results and topics that were not in the first edition. For compact Lie groups, the book covers the Peter–Weyl theorem, Lie algebra, conjugacy of maximal tori, the Weyl group, roots and weights, Weyl character formula, the fundamental group and more. The book continues with the study of complex analytic groups and general noncompact Lie groups, covering the Bruhat decomposition, Coxeter groups, flag varieties, symmetric spaces, Satake diagrams, embeddings of Lie groups and spin. Other topics that are treated are symmetric function theory, the representation theory of the symmetric group, Frobenius–Schur duality and $GL(n) \times GL(m)$ duality with many applications including some in random matrix theory, branching rules, Toeplitz determinants, combinatorics of tableaux, Gelfand pairs, Hecke algebras, the "philosophy of cusp forms" and the cohomology of Grassmannians. An appendix introduces the reader to the use of Sage mathematical software for Lie group computations.

A comprehensive introduction to the tools, techniques and applications of convex optimization.

A groundbreaking introduction to vectors, matrices, and least squares for engineering applications, offering a wealth of practical examples.

Problems and Theorems in Analysis

Vectors, Matrices, and Least Squares

The Development of Mathematical Thinking

Principia Mathematica

Set Theory and the Continuum Hypothesis

Stanford Mathematics Problem Book

An antidote to mathematical rigor mortis, teaching how to guess answers without needing a proof or an exact calculation. In problem solving, as in street fighting, rules are for fools: do whatever works—don't just stand there! Yet we often fear an unjustified leap even though it may land us on a correct result. Traditional mathematics teaching is largely about solving exactly stated problems exactly, yet life often hands us partly defined problems needing only moderately accurate solutions. This engaging book is an antidote to the rigor mortis brought on by too much mathematical rigor, teaching us how to guess answers without needing a proof or an exact calculation. In *Street-Fighting Mathematics*, Sanjoy Mahajan builds, sharpens, and demonstrates tools for educated guessing and down-and-dirty, opportunistic problem solving across diverse fields of knowledge—from mathematics to management. Mahajan describes six tools: dimensional analysis, easy cases, lumping, picture proofs, successive approximation, and reasoning by analogy. Illustrating each tool with numerous examples, he carefully separates the tool—the general principle—from the particular application so that the reader can most easily grasp the tool itself to use on problems of particular interest. *Street-Fighting Mathematics* grew out of a short course taught by the author at MIT for students ranging from first-year undergraduates to graduate students ready for careers in physics, mathematics, management, electrical engineering, computer science, and biology. They benefited from an approach that avoided rigor and taught them how to use mathematics to solve real problems. *Street-Fighting Mathematics* will appear in print and online under a Creative Commons Noncommercial Share Alike license.

A unique, heuristic approach to mathematical discovery and problem solving This combined edition of *Mathematical Discovery: On Understanding, Learning and Teaching Problem Solving* is unique among mathematics texts. Espousing a heuristic approach to mathematical problem solving, the text may be followed sequentially or according to instructors' individualized curricula. Beginning with a discussion of patterns and practical approaches to problem solving, the book then presents examples from various branches of math and science to help students discover how to solve problems on their own – an invaluable skill for the classroom and beyond.

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 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.

Problem Book in High-school Mathematics

A Problem Book in Real Analysis

How to Solve It

The William Lowell Putnam Mathematical Competition 1985–2000

A Personal Perspective

Using Physical Reasoning to Solve Problems

In the twenty-first century, everyone can benefit from being able to think mathematically. This is not the same as "doing math." The latter usually involves the application of formulas, procedures, and symbolic manipulations; mathematical thinking is a powerful way of thinking about things in the world -- logically, analytically, quantitatively, and with precision. It is not a natural way of thinking, but it can be learned. Mathematicians, scientists, and engineers need to "do math," and it takes many years of college-level education to learn all that is required. Mathematical thinking is valuable to everyone, and can be mastered in about six weeks by anyone who has completed high school mathematics. Mathematical thinking does not have to be about mathematics at all, but parts of mathematics provide the ideal target domain to learn how to think that way, and that is the approach taken by this short but valuable book. The book is written primarily for first and second year students of science, technology, engineering, and mathematics (STEM) at colleges and universities, and for high school students intending to study a STEM subject at university. Many students encounter difficulty going from high school math to college-level mathematics. Even if they did well at math in school, most are knocked off course for a while by the shift in emphasis, from the K-12 focus on mastering procedures to the "mathematical thinking" characteristic of much university mathematics. Though the majority survive the transition, many do not. To help them make the shift, colleges and universities often have a "transition course." This book could serve as a textbook or a supplementary source for such a course. Because of the widespread applicability of mathematical thinking, however, the book has been kept short and written in an engaging style, to make it accessible to anyone who seeks to extend and improve their analytic thinking skills. Going beyond a basic grasp of analytic thinking that everyone can benefit from, the STEM student who truly masters mathematical thinking will find that college-level mathematics goes from being confusing, frustrating, and at times seemingly impossible, to making sense and being hard but doable. Dr. Keith Devlin is a professional mathematician at Stanford University and the author of 31 previous books and over 80 research papers. His books have earned him many awards, including the Pythagoras Prize, the Carl Sagan Award, and the Joint Policy Board for Mathematics Communications Award. He is known to millions of NPR listeners as "the Math Guy" on Weekend Edition with Scott Simon. He writes a popular monthly blog "Devlin's Angle" for the Mathematical Association of America, another blog under the name "profkeithdevlin", and also blogs on various topics for the Huffington Post.

Based on Stanford University's well-known competitive exam, this excellent mathematics workbook offers students at both high school and college levels a complete set of problems, hints, and solutions. 1974 edition.

The Stanford Mathematics Problem Book With Hints and Solutions Courier Corporation

Convex Optimization

Proofs in Competition Math: Volume 1

The Story of Unshakable Mathematician Sophie Germain

Problems, Solutions and Commentary

Solving Mathematical Problems

The USSR Olympiad Problem Book

"Fun and highly formidable math problems and puzzles from noted puzzle creator Terry Stickels." — Window on Resources Two friends wish to meet for breakfast twice a month throughout the year. In how many ways can they choose those two days so that they never meet on consecutive days? You want to measure 30 seconds and you have two pieces of string, each of which burns for 40 seconds. How do you accomplish this without bending, folding, or cutting the strings? A positive whole number is divisible by 3 and also by 5. When the number is divided by 7, the remainder is 5. What is the smallest such number? That could work? These are but a few of this book's assembly of the most challenging puzzles imaginable? and they require no background in higher math, just good thinking skills. Terry Stickels, a well-known puzzle-maker, has compiled 101 of some of the best and most entertaining problems ever published. All of the challenges, which range from probability puzzles to dice games, have two things in common: each offers the "Aha!" moment of discovery that puzzle-solvers love, and they're all fun. Complete solutions for all puzzles explain every detail.

Education is an admirable thing, but it is well to remember from time to time that nothing worth knowing can be taught. Oscar Wilde, "The Critic as Artist," 1890. Analysis is a profound subject; it is not easy to understand nor summarize. However, Real Analysis can be discovered by solving problems. This book aims to give independent students the opportunity to discover Real Analysis by themselves through problem solving. The depth and complexity of the theory of Analysis can be appreciated by taking a glimpse at its developmental history. Although Analysis was conceived in the 17th century during the Scientific Revolution, it has taken nearly two hundred years to establish its theoretical basis. Kepler, Galileo, Descartes, Fermat, Newton and Leibniz were among those who contributed to its general development. The conceptual changes in Analysis were brought about in the 19th century by Cauchy and Weierstrass. Furthermore, modern concepts such as open and closed sets were introduced in the 1900s. Today, every undergraduate mathematics program requires at least one semester of Real Analysis. Often, students consider this course to be the most challenging or even intimidating of all their mathematical requirements. The primary goal of this book is to alleviate those concerns by systematically solving the problems related to the core concepts of most analysis courses. In doing so, we hope that Real Analysis becomes less taxing and thereby more satisfying.

Not limited to merely mathematics, probability has a rich and controversial philosophical aspect. A Philosophical Introduction to Probability showcases lesser-known philosophical notions of probability and explores the debate over their interpretations. Galavotti traces the history of probability and its mathematical properties and then discusses various philosophical positions on probability, from the Bayesian view to Laplace's "classical" interpretation of probability to the logical interpretation proposed by John Maynard Keynes. This book is a valuable resource for students in philosophy and mathematics and for all readers interested in notions of probability.

Challenging Math Problems

Introduction to Mathematical Thinking

Concrete Mathematics: A Foundation for Computer Science

The Transformation of Mathematics in the Early Mediterranean World

My Best Mathematical and Logic Puzzles

The Stanford Mathematics Problem Book

The transformation of mathematics from ancient Greece to the medieval Arab-speaking world is here approached by focusing on a single problem proposed by Archimedes and the many solutions offered. In this trajectory Reviel Netz follows the change in the task from solving a geometrical problem to its expression as an equation, still formulated geometrically, and then on to an algebraic problem, now handled by procedures that are more like rules of manipulation. From a practice of mathematics based on the localized solution (and grounded in the polemical practices of early Greek science) we see a transition to a practice of mathematics based on the systematic approach (and grounded in the deuteronomic practices of Late Antiquity and the Middle Ages). With three chapters ranging chronologically from Hellenistic mathematics, through late Antiquity, to the medieval world, Reviel Netz offers an alternate interpretation of the historical journey of pre-modern mathematics.

Rich selection of 100 practice problems — with hints and solutions — for students preparing for the William Lowell Putnam and other undergraduate-level mathematical competitions. Features real numbers, differential equations, integrals, polynomials, sets, other topics. Hours of stimulating challenge for math buffs at varying degrees of proficiency. References.

Banish math anxiety and give students of all ages a clear roadmap to success Mathematical Mindsets provides practical strategies and activities to help teachers and parents show all children, even those who are convinced that they are bad at math, that they can enjoy and succeed in math. Jo

Boaler—Stanford researcher, professor of math education, and expert on math learning—has studied why students don't like math and often fail in math classes. She's followed thousands of students through middle and high schools to study how they learn and to find the most effective ways to unleash the math potential in all students. There is a clear gap between what research has shown to work in teaching math and what happens in schools and at home. This book bridges that gap by turning research findings into practical activities and advice. Boaler translates Carol Dweck's concept of 'mindset' into math teaching and parenting strategies, showing how students can go from self-doubt to strong self-confidence, which is so important to math learning. Boaler reveals the steps that must be taken by schools and parents to improve math education for all. Mathematical Mindsets: Explains how the brain processes mathematics learning Reveals how to turn mistakes and struggles into valuable learning experiences Provides examples of rich mathematical activities to replace rote learning Explains ways to give students a positive math mindset Gives examples of how assessment and grading policies need to change to support real understanding Scores of students hate and fear math, so they end up leaving school without an understanding of basic mathematical concepts. Their evasion and departure hinders math-related pathways and STEM career opportunities. Research has shown very clear methods to change this phenomena, but the information has been confined to research journals—until now. Mathematical Mindsets provides a proven, practical roadmap to mathematics success for any student at any age.

Philosophical Introduction to Probability

Lie Groups

The Stanford Mathematics Problem Book with Hints and Solutions

Nothing Stopped Sophie

Pascal, Fermat, and the Seventeenth-Century Letter That Made the World Modern

Introduction to Applied Linear Algebra

Class-tested and coherent, this textbook teaches classical and web information retrieval, including web search and the related areas of text classification and text clustering from basic concepts. It gives an up-to-date treatment of all aspects of the design and implementation of systems for gathering, indexing, and searching documents; methods for evaluating systems; and an introduction to the use of machine learning methods on text collections. All the important ideas are explained using examples and figures, making it perfect for introductory courses in information retrieval for advanced undergraduates and graduate students in computer science. Based on feedback from extensive classroom experience, the book has been carefully structured in order to make teaching more natural and effective. Slides and additional exercises (with solutions for lecturers) are also available through the book's supporting website to help course instructors prepare their lectures.

Examines a letter written by Blaise Pascal to Pierre de Fermat in 1654 that speaks of probability and numerical values that have had an impact on the modern world with regard to calculating insurance rates, the housing markets, and car safety.

Over 300 challenging problems in algebra, arithmetic, elementary number theory and trigonometry, selected from Mathematical Olympiads held at Moscow University. Only high school math needed. Includes complete solutions. Features 27 black-and-white illustrations. 1962 edition.

Introduction to Information Retrieval

The Unfinished Game

Mathematical Mindsets

Unleashing Students' Potential through Creative Math, Inspiring Messages and Innovative Teaching

From Problems to Equations

The Green Book of Mathematical Problems

Ravi Vakil, described in the San Francisco Chronicle as “a legend in the world of math competitions” has finally released his long-awaited second edition of A Mathematical Mosaic: Patterns & Problem Solving. Regarded by many as a seminal book in the field of mathematics competitions, the first edition of A Mathematical Mosaic has received wide acclaim from mathematics teachers, professors and the mathematics community at large. In a review in The Mathematics Teacher, high school teacher John Cocharo wrote, “Without a doubt, this book is a must for any library, teacher's reference or student's amusement.” André Toom in his review in the Mathematical Monthly observed, “[A Mathematical Mosaic] speaks in an interesting and understandable way about number theory, combinatorics, game theory, geometry, and calculus, to say nothing about magic tricks, puzzles and other digressions. What is most important is that whenever Vakil starts to discuss something, he never leaves the reader without a piece of exact, rigorous knowledge.”

The true story of eighteenth-century mathematician Sophie Germain, who solved the unsolvable to achieve her dream. When her parents took away her candles to keep their young daughter from studying math...nothing stopped Sophie. When a professor discovered that the homework sent to him under a male pen name came from a woman...nothing stopped Sophie. And when she tackled a math problem that male scholars said would be impossible to solve...still, nothing stopped Sophie. For six years Sophie Germain used her love of math and her undeniable determination to test equations that would predict patterns of vibrations. She eventually became the first woman to win a grand prize from France's prestigious Academy of Sciences for her formula, which laid the groundwork for much of modern architecture (and can be seen in the book's illustrations). Award-winning author Cheryl Bardoe's inspiring and poetic text is brought to life by acclaimed artist Barbara McClintock's intricate pen-and-ink, watercolor, and collage illustrations in this true story about a woman who let nothing stop her.

The noted expert selects 70 of his favorite "short" puzzles, including such mind-bogglers as The Returning Explorer, The Mutilated Chessboard, Scrambled Box Tops, and dozens more involving logic and basic math. Solutions included.

With Hints and Solutions

The Art of Educated Guessing and Opportunistic Problem Solving

Patterns & Problem Solving

Mathematics for Machine Learning

The Mathematical Mechanic

Street-Fighting Mathematics

A perennial bestseller by eminent mathematician G. Polya, How to Solve It will show anyone in any field how to think straight. In lucid and appealing prose, Polya reveals how the mathematical method of demonstrating a proof or finding an unknown can be of help in attacking any problem that can be "reasoned" out—from building a bridge to winning a game of anagrams. Generations of readers have relished Polya's deft—indeed, brilliant—instructions on stripping away irrelevancies and going straight to the heart of the problem.

In this delightful book, Levi turns math and physics upside down, revealing how physics can simplify proofs and lead to quicker solutions and new theorems, and how physical solutions can illustrate why results are true in ways lengthy mathematical calculations never can.

The International Mathematical Olympiad (IMO) is a very important competition for high school students. China has taken part in the IMO 31 times since 1985 and has won the top ranking for countries 19 times, with a multitude of gold medals for individual students. The six students China has sent every year were selected from 60 students among approximately 300 students who took part in the annual China Mathematical Competition during the winter months. This book includes the problems and solutions of the most important mathematical competitions from 2010 to 2014 in China, such as China Mathematical Competition, China Mathematical Olympiad, China Girls' Mathematical Olympiad. These problems are almost exclusively created by the experts who are engaged in mathematical competition teaching and researching. Some of the solutions are from national training team and national team members, their wonderful solutions being the feature of this book. This book is useful to mathematics fans, middle school students engaged in mathematical competition, coaches in mathematics teaching and teachers setting up math elective courses.

Selected Problems and Theorems of Elementary Mathematics

A Mathematical Mosaic

Dr. Wright's Kitchen Table Math

Actual Size

Theory of Functions · Zeros · Polynomials Determinants · Number Theory · Geometry

A New Aspect of Mathematical Method

This exploration of a notorious mathematical problem is the work of the man who discovered the solution. Written by an award-winning professor at Stanford University, it employs intuitive explanations as well as detailed mathematical proofs in a self-contained treatment. This unique text and reference is suitable for students and professionals. 1966 edition. Copyright renewed 1994.

Authored by a leading name in mathematics, this engaging and clearly presented text leads the reader through the tactics involved in solving

mathematical problems at the Mathematical Olympiad level. With numerous exercises and assuming only basic mathematics, this text is ideal for students of 14 years and above in pure mathematics.

The fundamental mathematical tools needed to understand machine learning include linear algebra, analytic geometry, matrix decompositions, vector calculus, optimization, probability and statistics. These topics are traditionally taught in disparate courses, making it hard for data science or computer science students, or professionals, to efficiently learn the mathematics. This self-contained textbook bridges the gap between mathematical and machine learning texts, introducing the mathematical concepts with a minimum of prerequisites. It uses these concepts to derive four central machine learning methods: linear regression, principal component analysis, Gaussian mixture models and support vector machines. For students and others with a mathematical background, these derivations provide a starting point to machine learning texts. For those learning the mathematics for the first time, the methods help build intuition and practical experience with applying mathematical concepts. Every chapter includes worked examples and exercises to test understanding. Programming tutorials are offered on the book's web site.

A Day's Adventure in Math Wonderland

Mathematical Olympiad In China (2011–2014): Problems And Solutions

Mathematical Discovery on Understanding, Learning and Teaching Problem Solving, Volumes I and II

The Stanford Mathematics Problem Book: with Hints and Solutions

How big is a crocodile? What about a tiger, or the world's largest spider? Can you imagine a tongue that is two feet long or an eye that's bigger than your head? Sometimes facts and figures don't tell the whole story. Sometimes you need to see things for yourself—at their actual size.