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102 Combinatorial Problems MAA

This problem-solving book is an introduction to the study of Diophantine equations, a class of equations in which only integer solutions are allowed. The presentation features some classical Diophantine equations, including linear, Pythagorean, and some higher degree equations, as well as exponential Diophantine equations. Many of the selected exercises and problems are original or are presented with original solutions. An Introduction to Diophantine Equations: A Problem-Based Approach is intended for undergraduates, advanced high school students and teachers, mathematical contest participants — including Olympiad and Putnam competitors — as well as readers interested in essential mathematics. The work uniquely presents unconventional and non-routine examples, ideas, and techniques.

110 Geometry Problems for the International Mathematical Olympiad Universities Press
"Problem-Solving and Selected Topics in Euclidean Geometry: in the Spirit of the Mathematical Olympiads" contains theorems which are of particular value for the solution of geometrical problems. Emphasis is given in the discussion of a variety of methods, which play a significant role for the solution of problems in Euclidean Geometry. Before the complete solution of every problem, a key idea is presented so that the reader will be able to provide the solution. Applications of the basic geometrical methods which include analysis, synthesis, construction and proof are given. Selected problems which have been given in mathematical olympiads or proposed in short lists in IMO's are discussed. In addition, a number of problems proposed by leading mathematicians in the subject are included here. The book also contains new problems with their solutions. The scope of the publication of the present book is to teach mathematical thinking through Geometry and to provide inspiration for both students and teachers to formulate "positive" conjectures and provide solutions.

The William Lowell Putnam Mathematical Competition 1985-2000 Springer Science & Business Media

The main purpose of this book is to provide an introduction to central topics in elementary algebra from a problem-solving point of view. While working with students who were preparing for various mathematics competitions or exams, the author observed that fundamental algebraic techniques were not part of their mathematical repertoire. Since algebraic skills are not only critical to algebra itself but also to numerous other mathematical fields, a lack of such knowledge can drastically hinder a student's performance. Taking the above observations into account, the author has put together this introductory book using both simple and challenging examples which shed light upon essential algebraic strategies and techniques, as well as their application in diverse meaningful problems. This work is the first volume in a series of such books. The featured topics from elementary and classical algebra include factorizations, algebraic identities, inequalities, algebraic

equations and systems of equations. More advanced concepts such as complex numbers, exponents and logarithms, as well as other topics, are generally avoided. Nevertheless, some problems are constructed using properties of complex numbers which challenge and expose the reader to a broader spectrum of mathematics. Each chapter focuses on specific methods or strategies and provides an ample collection of accompanying problems that graduate in difficulty and complexity. In order to assist the reader with verifying mastery of the theoretical component, 105 problems are included in the last sections of the book, of which 52 are introductory and 53 are advanced. All problems come together with solutions, many employing several approaches and providing the motivation behind the solutions offered.

Mathematical Olympiad Challenges John Wiley & Sons

This is a practical anthology of some of the best elementary problems in different branches of mathematics. Arranged by subject, the problems highlight the most common problem-solving techniques encountered in undergraduate mathematics. This book teaches the important principles and broad strategies for coping with the experience of solving problems. It has been found very helpful for students preparing for the Putnam exam.

Mathematical Olympiad Challenges Springer Science & Business Media

"The IMO Compendium" is the ultimate collection of challenging high-school-level mathematics problems and is an invaluable resource not only for high-school students preparing for mathematics competitions, but for anyone who loves and appreciates mathematics. The International Mathematical Olympiad (IMO), nearing its 50th anniversary, has become the most popular and prestigious competition for high-school students interested in mathematics. Only six students from each participating country are given the honor of participating in this competition every year. The IMO represents not only a great opportunity to tackle interesting and challenging mathematics problems, it also offers a way for high school students to measure up with students from the rest of the world. Until the first edition of this book appearing in 2006, it has been almost impossible to obtain a complete collection of the problems proposed at the IMO in book form. "The IMO Compendium" is the result of a collaboration between four former IMO participants from Yugoslavia, now Serbia and Montenegro, to rescue these problems from old and scattered manuscripts, and produce the ultimate source of IMO practice problems. This book attempts to gather all the problems and solutions appearing on the IMO through 2009. This second edition contains 143 new problems, picking up where the 1959-2004 edition has left off.

Lemmas in Olympiad Geometry Xyz Press

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 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 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 IMO Compendium Mitchell Beazley

Presents hundreds of extreme value problems, examples, and solutions primarily through Euclidean geometry Unified approach to the subject, with emphasis on geometric, algebraic, analytic, and combinatorial reasoning Applications to physics, engineering, and economics Ideal for use at the junior and senior undergraduate level, with wide appeal to students, teachers, professional mathematicians, and puzzle enthusiasts

Combinatorial Problems and Exercises Springer Science & Business Media

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 mathematicians and adults who enjoy interesting mathematics.

The Art and Craft of Problem Solving Springer Science & Business Media

This third volume of problems from the William Lowell Putnam Competition is unlike the previous two 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 solutions have been compiled from the American Mathematical Monthly, Mathematics Magazine and past competitors. Multiple solutions enhance the understanding of the audience, explaining techniques that have relevance to more than the problem at hand. In addition, the book contains suggestions for further reading, a hint to each problem, separate from the full solution and background information about the competition. The book will appeal to students, teachers, professors and indeed anyone interested in problem solving as a gateway to a deep understanding of mathematics.

Problems from the Book Springer Science & Business Media

This unique approach to combinatorics is centered around unconventional, essay-type combinatorial examples, followed by a number of carefully selected, challenging problems and extensive discussions of their solutions. Topics encompass permutations and combinations, binomial coefficients and their applications, bijections, inclusions and exclusions, and generating functions. Each chapter features fully-worked problems, including many from Olympiads and other competitions, as well as a number of problems original to the authors; at the end of each chapter

are further exercises to reinforce understanding, encourage creativity, and build a repertory of problem-solving techniques. The authors' previous text, "102 Combinatorial Problems," makes a fine companion volume to the present work, which is ideal for Olympiad participants and coaches, advanced high school students, undergraduates, and college instructors. The book's unusual problems and examples will interest seasoned mathematicians as well. "A Path to Combinatorics for Undergraduates" is a lively introduction not only to combinatorics, but to mathematical ingenuity, rigor, and the joy of solving puzzles.

An Introduction to Diophantine Equations Cambridge University Press

The aim of this book is to introduce a range of combinatorial methods for those who want to apply these methods in the solution of practical and theoretical problems. Various tricks and techniques are taught by means of exercises. Hints are given in a separate section and a third section contains all solutions in detail. A dictionary section gives definitions of the combinatorial notions occurring in the book. Combinatorial Problems and Exercises was first published in 1979. This revised edition has the same basic structure but has been brought up to date with a series of exercises on random walks on graphs and their relations to eigenvalues, expansion properties and electrical resistance. In various chapters the author found lines of thought that have been extended in a natural and significant way in recent years. About 60 new exercises (more counting sub-problems) have been added and several solutions have been simplified.

The Cauchy-Schwarz Master Class Clarendon Press

This book contains 106 geometry problems used in the AwesomeMath Summer Program to train and test top middle and high-school students from the U.S. and around the world. Just as the camp offers both introductory and advanced courses, this book also builds up the material gradually. The authors begin with a theoretical chapter where they familiarize the reader with basic facts and problem-solving techniques. Then they proceed to the main part of the work, the problem sections. The problems are a carefully selected and balanced mix which offers a vast variety of flavors and difficulties, ranging from AMC and AIME levels to high-end IMO problems. Out of thousands of Olympiad problems from around the globe, the authors chose those which best illustrate the featured techniques and their applications. The problems meet the authors' demanding taste and fully exhibit the enchanting beauty of classical geometry. For every problem, they provide a detailed solution and strive to pass on the intuition and motivation behind it. Many problems have multiple solutions. Directly experiencing Olympiad geometry both as contestants and instructors, the authors are convinced that a neat diagram is essential to efficiently solve a geometry problem. Their diagrams do not contain anything superfluous, yet emphasize the key elements and benefit from a good choice of orientation. Many of the proofs should be legible only from looking at the diagrams.

Problem-Solving Methods in Combinatorics MAA

This book showcases the synthetic problem-solving methods which frequently appear in modern day Olympiad geometry, in the way we believe they should be taught to someone with little familiarity in the subject. In some sense, the text also represents an unofficial sequel to the recent problem collection published by XYZ Press, 110 Geometry Problems for the International Mathematical Olympiad, written by the first and third authors, but the two books can be studied completely independently of each other. The work is designed as a medley of the important Lemmas in classical

geometry in a relatively linear fashion: gradually starting from Power of a Point and common results to more sophisticated topics, where knowing a lot of techniques can prove to be tremendously useful. We treat each chapter as a short story of its own and include numerous solved exercises with detailed explanations and related insights that will hopefully make your journey very enjoyable.

[104 Number Theory Problems](#) Springer Science & Business Media

Every year there is at least one combinatorics problem in each of the major international mathematical olympiads. These problems can only be solved with a very high level of wit and creativity. This book explains all the problem-solving techniques necessary to tackle these problems, with clear examples from recent contests. It also includes a large problem section for each topic, including hints and full solutions so that the reader can practice the material covered in the book. The material will be useful not only to participants in the olympiads and their coaches but also in university courses on combinatorics.

[105 Algebra Problems from the AwesomeMath Summer Program](#) Elsevier

"102 Combinatorial Problems" consists of carefully selected problems that have been used in the training and testing of the USA International Mathematical Olympiad (IMO) team. Key features: * Provides in-depth enrichment in the important areas of combinatorics by reorganizing and enhancing problem-solving tactics and strategies * Topics include: combinatorial arguments and identities, generating functions, graph theory, recursive relations, sums and products, probability, number theory, polynomials, theory of equations, complex numbers in geometry, algorithmic proofs, combinatorial and advanced geometry, functional equations and classical inequalities The book is systematically organized, gradually building combinatorial skills and techniques and broadening the student's view of mathematics. Aside from its practical use in training teachers and students engaged in mathematical competitions, it is a source of enrichment that is bound to stimulate interest in a variety of mathematical areas that are tangential to combinatorics.

[A Path to Combinatorics for Undergraduates](#) Springer Science & Business Media

Problems and solutions from Mathematical Olympiad. Ideal for anyone interested in mathematical problem solving.

[Topics in Functional Equations](#) Springer Science & Business Media

Best Sellers - Books :

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- [To Kill A Mockingbird By Harper Lee](#)
- [A Court Of Thorns And Roses \(a Court Of Thorns And Roses, 1\) By Sarah J. Maas](#)
- [The Housemaid](#)
- [Harry Potter Paperback Box Set \(books 1-7\) By J. K. Rowling](#)
- [A Court Of Silver Flames \(a Court Of Thorns And Roses, 5\) By Sarah J. Maas](#)

This text on mathematical problem solving provides a comprehensive outline of "problemsolving-ology," concentrating on strategy and tactics. It discusses a number of standard mathematical subjects such as combinatorics and calculus from a problem solver's perspective.

[102 Combinatorial Problems](#) Springer Science & Business Media

This introductory textbook takes a problem-solving approach to number theory, situating each concept within the framework of an example or a problem for solving. Starting with the essentials, the text covers divisibility, unique factorization, modular arithmetic and the Chinese Remainder Theorem, Diophantine equations, binomial coefficients, Fermat and Mersenne primes and other special numbers, and special sequences. Included are sections on mathematical induction and the pigeonhole principle, as well as a discussion of other number systems. By emphasizing examples and applications the authors motivate and engage readers.

[103 Trigonometry Problems](#) Springer Science & Business Media

This book is intended for the Mathematical Olympiad students who wish to prepare for the study of inequalities, a topic now of frequent use at various levels of mathematical competitions. In this volume we present both classic inequalities and the more useful inequalities for confronting and solving optimization problems. An important part of this book deals with geometric inequalities and this fact makes a big difference with respect to most of the books that deal with this topic in the mathematical olympiad. The book has been organized in four chapters which have each of them a different character. Chapter 1 is dedicated to present basic inequalities. Most of them are numerical inequalities generally lacking any geometric meaning. However, where it is possible to provide a geometric interpretation, we include it as we go along. We emphasize the importance of some of these inequalities, such as the inequality between the arithmetic mean and the geometric mean, the Cauchy-Schwarz inequality, the rearrangement inequality, the Jensen inequality, the Muirhead theorem, among others. For all these, besides giving the proof, we present several examples that show how to use them in mathematical olympiad problems. We also emphasize how the substitution strategy is used to deduce several inequalities.

[Problems in Real Analysis](#) John Wiley & Sons

A collection of problems put together by coaches of the U.S. International Mathematical Olympiad Team.