Algebraic Geometry A Problem Solving Approach Student Mathematical Library

Analytic and Algebraic GeometryFoundations of Algebraic GeometryUndergraduate Algebraic GeometryAlgebraic Geometry INumerically Solving Polynomial Systems with BertiniThe Humongous Book of Algebra ProblemsSolving Polynomial EquationsChallenging Problems in AlgebraLet's Play MathChallenging Problems in GeometryAlgebraic Geometry for Scientists and EngineersIntroduction to Algebraic GeometryClassical Algebraic GeometryAlgebraic GeometryComputing in Algebraic GeometryEffective Methods in Algebraic GeometryLinear Algebra, Geometry and TransformationAlgebraic Geometry Modeling in Information TheoryThe Geometry of SyzygiesComputational Algebraic GeometryAlgorithms in Real Algebraic GeometryIntroduction to GeometryOpen Middle MathIntroduction to Algebraic GeometryElementary Algebraic GeometryAlgebraic GeometryRudiments of Algebraic GeometrySemidefinite Optimization and Convex Algebraic Geometry3264 and All ThatAn Invitation to Algebraic GeometryA Guide to Plane Algebraic CurvesProgramming ChallengesIntroduction to Algebraic GeometryComputations in Algebraic Geometry with Macaulay 2Introduction to AlgebraProblem-Solving Through ProblemsAlgebraic GeometryElementary Algebraic GeometryProblem-Solving StrategiesCollege Geometry

Analytic and Algebraic Geometry

This book is a true introduction to the basic concepts and techniques of algebraic geometry. The language is purposefully kept on an elementary level, avoiding sheaf theory and cohomology theory. The introduction of new algebraic concepts is always motivated by a discussion of the corresponding geometric ideas. The main point of the book is to illustrate the interplay between abstract theory and specific examples. The book contains numerous problems that illustrate the general theory. The text is suitable for advanced undergraduates and beginning graduate students. It contains sufficient material for a one-semester course. The reader should be familiar with the basic concepts of modern algebra. A course in one complex variable would be helpful, but is not necessary.

Foundations of Algebraic Geometry

Undergraduate Algebraic Geometry

Algebraic Geometry I

Collection of nearly 200 unusual problems dealing with congruence and parallelism, the Pythagorean theorem, circles, area relationships, Ptolemy and the cyclic quadrilateral, collinearity and concurrency and more. Arranged in order of difficulty. Detailed solutions.

Numerically Solving Polynomial Systems with Bertini

Algebraic Geometry has been at the center of much of mathematics for hundreds of years. It is not an easy field to break into, despite its humble beginnings in the study of circles, ellipses, hyperbolas, and parabolas. This text consists of a series of ex

The Humongous Book of Algebra Problems

"This second edition of an introductory text is intended for advanced undergraduate and graduate students who have taken a one-year course in algebra and are familiar with complex analysis. Concrete examples and exercises illuminate chapters on curves, ring theory, arbitrary dimension, and other topics. Includes numerous updated figures specially redrawn for this edition. 2014 edition"--

Solving Polynomial Equations

This book, based on lectures presented in courses on algebraic geometry taught by the author at Purdue University, is intended for engineers and scientists (especially computer scientists), as well as graduate students and advanced undergraduates in mathematics. In addition to providing a concrete or algorithmic approach to algebraic geometry, the author also attempts to motivate and explain its link to more modern algebraic geometry based on abstract algebra.The book covers various topics in the theory of algebraic curves and surfaces, such as rational and polynomial parametrization, functions and differentials on a curve, branches and valuations, and resolution of singularities. The emphasis is on presenting heuristic ideas and suggestive arguments rather than formal proofs. Readers will gain new insight into the subject of algebraic geometry in a way that should increase appreciation of modern treatments of the subject, as well as enhance its utility in applications in science and industry.

Challenging Problems in Algebra

Algebraic geometry has benefited enormously from the powerful general machinery developed in the latter half of the twentieth century. The cost has been that much of the research of previous generations is in a language unintelligible to modern workers, in particular, the rich legacy of classical algebraic geometry, such as plane algebraic curves of low degree, special algebraic surfaces, theta functions, Cremona transformations, the theory of apolarity and the geometry of lines in projective spaces. The author's contemporary approach makes this legacy accessible to modern algebraic geometers and to others who are interested in applying classical results. The vast bibliography of over 600 references is complemented by an array of exercises that extend or exemplify results given in the book.

Let's Play Math

An accessible introduction to plane algebraic curves that also serves as a natural entry point to algebraic geometry.

Challenging Problems in Geometry

A unique collection of competition problems from over twenty major national and international mathematical competitions for high school students. Written for trainers and participants of contests of all levels up to the highest level, this will appeal to high school teachers conducting a mathematics club who need a range of simple to complex problems and to those instructors wishing to pose a "problem of the week", thus bringing a creative atmosphere into the classrooms. Equally, this is a must-have for individuals interested in solving difficult and challenging problems. Each chapter starts with typical examples illustrating the central concepts and is followed by a number of carefully selected problems and their solutions. Most of the solutions are complete, but some merely point to the road leading to the final solution. In addition to being a valuable resource of mathematical problems and solution strategies, this is the most complete training book on the market.

Algebraic Geometry for Scientists and Engineers

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.

Introduction to Algebraic Geometry

"The CAFE is an acronym for Comprehension, Accuracy, Fluency, and Expanding Vocabulary. The book provides a framework and system for teaching reading through these core components, and guides readers through the process of responsive teaching"--

Classical Algebraic Geometry

This book provides a quick access to computational tools for algebraic geometry, the mathematical discipline which handles solution sets of polynomial equations. Originating from a number of intense one week schools taught by the authors, the text is designed so as to provide a step by step introduction which enables the reader to get started with his own computational experiments right away. The authors present the basic concepts and ideas in a compact way.

Algebraic Geometry

Algebraic geometry, central to pure mathematics, has important applications in such fields as engineering, computer science, statistics and computational biology, which exploit the computational algorithms that the theory provides. Users get the full benefit, however, when they know something of the underlying theory, as well as basic procedures and facts. This book is a systematic introduction to the central concepts of algebraic geometry most useful for computation. Written for advanced

undergraduate and graduate students in mathematics and researchers in application areas, it focuses on specific examples and restricts development of formalism to what is needed to address these examples. In particular, it introduces the notion of Gröbner bases early on and develops algorithms for almost everything covered. It is based on courses given over the past five years in a large interdisciplinary programme in computational algebraic geometry at Rice University, spanning mathematics, computer science, biomathematics and bioinformatics.

Computing in Algebraic Geometry

The subject of this book is the solution of polynomial equations, that is, s- tems of (generally) non-linear algebraic equations. This study is at the heart of several areas of mathematics and its applications. It has provided the - tivation for advances in di?erent branches of mathematics such as algebra, geometry, topology, and numerical analysis. In recent years, an explosive - velopment of algorithms and software has made it possible to solve many problems which had been intractable up to then and greatly expanded the areas of applications to include robotics, machine vision, signal processing, structural molecular biology, computer-aided design and geometric modelling, as well as certain areas of statistics, optimization and game theory, and b- logical networks. At the same time, symbolic computation has proved to be an invaluable tool for experimentation and conjecture in pure mathematics. As a consequence, the interest in e?ective algebraic geometry and computer algebrahasextendedwellbeyonditsoriginalconstituencyofpureandapplied mathematicians and computer scientists, to encompass many other scientists and engineers. While the core of the subject remains algebraic geometry, it also calls upon many other aspects of mathematics and theoretical computer science, ranging from numerical methods, di?erential equations and number theory to discrete geometry, combinatorics and complexity theory. Thegoalofthisbookistoprovideageneralintroduction tomodernma- ematical aspects in computing with multivariate polynomials and in solving algebraic systems.

Effective Methods in Algebraic Geometry

Linear Algebra, Geometry and Transformation

There are many distinct pleasures associated with computer programming. Craftsm- ship has its quiet rewards, the satisfaction that comes from building a useful object and making it work. Excitement arrives with the ?ash of insight that cracks a previously intractable problem. The spiritual quest for elegance can turn the hacker into an artist.
Therearepleasuresinparsimony,insqueezingthelastdropofperformanceoutofclever algorithms and tight coding.
Thegames,puzzles,andchallengesofproblemsfrominternationalprogrammingc-petitionsareagreatwaytoexperiencethesepleasureswhileimprovingyouralgorithmic and coding skills. This book contains over 100 problems that have appeared in previous programming contests, along with discussions of the theory and ideas

necessary to - tack them. Instant online grading for all of these problems is available from two WWW robot judging sites. Combining this book with a judge gives an exciting new way to challenge and improve your programming skills. This book can be used for self-study, for teaching innovative courses in algorithms and programming, and in training for international competition. To the Reader Theproblemsinthisbookhavebeenselectedfromover1,000programmingproblemsat the Universidad de Valladolid online judge, available athttp://online-judge.uva.es.The judgehasruledonwelloveronemillionsubmissionsfrom27,000registeredusersaround the world to date. We have taken only the best of the best, the most fun, exciting, and interesting problems available.

Algebraic Geometry Modeling in Information Theory

The Geometry of Syzygies

An introduction to abstract algebraic geometry, with the only prerequisites being results from commutative algebra, which are stated as needed, and some elementary topology. More than 400 exercises distributed throughout the book offer specific examples as well as more specialised topics not treated in the main text, while three appendices present brief accounts of some areas of current research. This book can thus be used as textbook for an introductory course in algebraic geometry following a basic graduate course in algebra. Robin Hartshorne studied algebraic geometry with Oscar Zariski and David Mumford at Harvard, and with J.-P. Serre and A. Grothendieck in Paris. He is the author of "Residues and Duality", "Foundations of Projective Geometry", "Ample Subvarieties of Algebraic Varieties", and numerous research titles.

Computational Algebraic Geometry

" To sum up, this book helps to learn algebraic geometry in a short time, its concrete style is enjoyable for students and reveals the beauty of mathematics." --Acta Scientiarum Mathematicarum

Algorithms in Real Algebraic Geometry

Over 300 unusual problems, ranging from easy to difficult, involving equations and inequalities, Diophantine equations, number theory, quadratic equations, logarithms, more. Detailed solutions, as well as brief answers, for all problems are provided.

Introduction to Geometry

This book is intended for self-study or as a textbook for graduate students or advanced undergraduates. It presupposes some basic knowledge of point-set topology and a solid foundation in linear algebra. Otherwise, it develops all of the commutative algebra, sheaf-theory and cohomology needed to understand the material. It also presents applications to robotics and other fields.

Open Middle Math

This book can form the basis of a second course in algebraic geometry. As motivation, it takes concrete questions from enumerative geometry and intersection theory, and provides intuition and technique, so that the student develops the ability to solve geometric problems. The authors explain key ideas, including rational equivalence, Chow rings, Schubert calculus and Chern classes, and readers will appreciate the abundant examples, many provided as exercises with solutions available online. Intersection is concerned with the enumeration of solutions of systems of polynomial equations in several variables. It has been an active area of mathematics since the work of Leibniz. Chasles' nineteenth-century calculation that there are 3264 smooth conic plane curves tangent to five given general conics was an important landmark, and was the inspiration behind the title of this book. Such computations were motivation for Poincaré's development of topology, and for many subsequent theories, so that intersection theory is now a central topic of modern mathematics.

Introduction to Algebraic Geometry

This book is a guide to concepts and practice in numerical algebraic geometry ? the solution of systems of polynomial equations by numerical methods. Through numerous examples, the authors show how to apply the well-received and widely used open-source Bertini software package to compute solutions, including a detailed manual on syntax and usage options. The authors also maintain a complementary web page where readers can find supplementary materials and Bertini input files. Numerically Solving Polynomial Systems with Bertini approaches numerical algebraic geometry from a user's point of view with numerous examples of how Bertini is applicable to polynomial systems. It treats the fundamental task of solving a given polynomial system and describes the latest advances in the field, including algorithms for intersecting and projecting algebraic sets, methods for treating singular sets, the nascent field of real numerical algebraic geometry, and applications to large polynomial systems arising from differential equations. Those who wish to solve polynomial systems can start gently by finding isolated solutions to small systems, advance rapidly to using algorithms for finding positive-dimensional solution sets (curves, surfaces, etc.), and learn how to use parallel computers on large problems. These techniques are of interest to engineers and scientists in fields where polynomial equations arise, including robotics, control theory, economics, physics, numerical PDEs, and computational chemistry.

Elementary Algebraic Geometry

"Analytic and algebraic geometers often study the same geometric structures but bring different methods to bear on them. While this dual approach has been spectacularly successful at solving problems, the language differences between algebra and analysis also represent a difficulty for students and researchers in geometry, particularly complex geometry. The PCMI program was designed to partially address this language gulf, by presenting some of the active developments in algebraic and analytic geometry in a form suitable for students on the 'other side' of the analysis-algebra language divide. One focal point of the

summer school was multiplier ideals, a subject of wide current interest in both subjects. The present volume is based on a series of lectures at the PCMI summer school on analytic and algebraic geometry. The series is designed to give a high-level introduction to the advanced techniques behind some recent developments in algebraic and analytic geometry. The lectures contain many illustrative examples, detailed computations, and new perspectives on the topics presented, in order to enhance access of this material to non-specialists."--Publisher's description.

Algebraic Geometry

When the numbers just don't add up Following in the footsteps of the successful The Humongous Books of Calculus Problems, bestselling author Michael Kelley has taken a typical algebra workbook, and made notes in the margins, adding missing steps and simplifying concepts and solutions. Students will learn how to interpret and solve 1000 problems as they are typically presented in algebra courses-and become prepared to solve those problems that were never discussed in class but always seem to find their way onto exams. Annotations throughout the text clarify each problem and fill in missing steps needed to reach the solution, making this book like no other algebra workbook on the market.

Rudiments of Algebraic Geometry

Aimed at advanced undergraduate students of mathematics, this concise text covers the basics of algebraic geometry. Topics include affine spaces, projective spaces, rational curves, algebraic sets with group structure, more. 1963 edition.

Semidefinite Optimization and Convex Algebraic Geometry

In this first-ever graduate textbook on the algorithmic aspects of real algebraic geometry, the main ideas and techniques presented form a coherent and rich body of knowledge, linked to many areas of mathematics and computing. Mathematicians already aware of real algebraic geometry will find relevant information about the algorithmic aspects. Researchers in computer science and engineering will find the required mathematical background. This self-contained book is accessible to graduate and undergraduate students.

3264 and All That

An accessible introduction to convex algebraic geometry and semidefinite optimization. For graduate students and researchers in mathematics and computer science.

An Invitation to Algebraic Geometry

This book presents algorithmic tools for algebraic geometry, with experimental applications. It also introduces Macaulay 2, a computer algebra system supporting research in algebraic geometry, commutative algebra, and their applications. The algorithmic tools presented here are designed to serve readers wishing to bring

such tools to bear on their own problems. The first part of the book covers Macaulay 2 using concrete applications; the second emphasizes details of the mathematics.

A Guide to Plane Algebraic Curves

Table of contents

Programming Challenges

This book presents a readable and accessible introductory course in algebraic geometry, with most of the fundamental classical results presented with complete proofs. An emphasis is placed on developing connections between geometric and algebraic aspects of the theory. Differences between the theory in characteristic and positive characteristic are emphasized. The basic tools of classical and modern algebraic geometry are introduced, including varieties, schemes, singularities, sheaves, sheaf cohomology, and intersection theory. Basic classical results on curves and surfaces are proved. More advanced topics such as ramification theory, Zariski's main theorem, and Bertini's theorems for general linear systems are presented, with proofs, in the final chapters. With more than 200 exercises, the book is an excellent resource for teaching and learning introductory algebraic geometry.

Introduction to Algebraic Geometry

The symposium "MEGA-90 - Effective Methods in Algebraic Geome try" was held in Castiglioncello (Livorno, Italy) in April 17-211990. The themes - we quote from the "Call for papers" - were the fol lowing: - Effective methods and complexity issues in commutative algebra, pro jective geometry, real geometry, algebraic number theory - Algebraic geometric methods in algebraic computing Contributions in related fields (computational aspects of group theory, differential algebra and geometry, algebraic and differential topology, etc.) were also welcome. The origin and the motivation of such a meeting, that is supposed to be the first of a series, deserves to be explained. The subject - the theory and the practice of computation in alge braic geometry and related domains from the mathematical viewpoin- has been one of the themes of the symposia organized by SIGSAM (the Special Interest Group for Symbolic and Algebraic Manipulation of the Association for Computing Machinery), SAME (Symbolic and Algebraic Manipulation in Europe), and AAECC (the semantics of the name is vary ing; an average meaning is "Applied Algebra and Error Correcting Codes").

Computations in Algebraic Geometry with Macaulay 2

The Essentials of a First Linear Algebra Course and MoreLinear Algebra, Geometry and Transformation provides students with a solid geometric grasp of linear transformations. It stresses the linear case of the inverse function and rank theorems and gives a careful geometric treatment of the spectral theorem.An Engaging Treatment of the Interplay amo

Introduction to Algebra

Algebraic & geometry methods have constituted a basic background and tool for people working on classic block coding theory and cryptography. Nowadays, new paradigms on coding theory and cryptography have arisen such as: Network coding, S-Boxes, APN Functions, Steganography and decoding by linear programming. Again understanding the underlying procedure and symmetry of these topics needs a whole bunch of non trivial knowledge of algebra and geometry that will be used to both, evaluate those methods and search for new codes and cryptographic applications. This book shows those methods in a self-contained form.

Problem-Solving Through Problems

This short and readable introduction to algebraic geometry will be ideal for all undergraduate mathematicians coming to the subject for the first time.

Algebraic Geometry

Elementary Algebraic Geometry

This is a description of the underlying principles of algebraic geometry, some of its important developments in the twentieth century, and some of the problems that occupy its practitioners today. It is intended for the working or the aspiring mathematician who is unfamiliar with algebraic geometry but wishes to gain an appreciation of its foundations and its goals with a minimum of prerequisites. Few algebraic prerequisites are presumed beyond a basic course in linear algebra.

Problem-Solving Strategies

First textbook-level account of basic examples and techniques in this area. Suitable for self-study by a reader who knows a little commutative algebra and algebraic geometry already. David Eisenbud is a well-known mathematician and current president of the American Mathematical Society, as well as a successful Springer author.

College Geometry

ROMANCE ACTION & ADVENTURE MYSTERY & THRILLER BIOGRAPHIES & HISTORY CHILDREN'S YOUNG ADULT FANTASY HISTORICAL FICTION HORROR LITERARY FICTION NON-FICTION SCIENCE FICTION

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