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Columbia, MO, USA

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This book emphasizes the isomorphic theory of Banach spaces and techniques using the unifying viewpoint of basic sequences. Its aim is to provide the reader with the necessary technical tools and background to reach the frontiers of research without the introduction of too many extraneous concepts. Detailed and accessible proofs are included, as are a variety of exercises and problems.

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A. Micheletti, D. Morale, University of Milano, Italy  
(Eds.)

## Math Everywhere

### Deterministic and Stochastic Modelling in Biomedicine, Economics and Industry

These proceedings report on the conference "Math Everywhere", celebrating the 60th birthday of the mathematician Vincenzo Capasso. The conference promoted ideas Capasso has pursued and shared the open atmosphere he is known for. Topic sections include: Deterministic and Stochastic Systems. Mathematical Problems in Biology, Medicine and Ecology. Mathematical Problems in Industry and Economics. The broad spectrum of contributions to this volume demonstrates the truth of its title: Math is Everywhere, indeed.

2007. XVIII, 343 p. 64 illus., 8 in color. Hardcover  
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## Groups and Representations

This book provides a concise treatment of some topics from group theory and representation theory. Ideal for a one-term course, it focuses on the non-commutative side of the field, emphasizing the general linear group as the most important group and example. Nearly 200 exercises of varying difficulty both reinforce the main concept and expose the reader to additional topics. The book assumes a familiarity with groups, rings, and fields.

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## Ramanujan's Lost Notebook

### Part I

In the library at Trinity College, Cambridge in 1976, George Andrews of Pennsylvania State University discovered a sheaf of pages in the handwriting of Srinivasa Ramanujan. Soon designated as "Ramanujan's Lost Notebook," it contains considerable material on mock theta functions and undoubtedly dates from the last year of Ramanujan's life. In this book, the notebook is presented with additional material and expert commentary.

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**V. I. Arnol'd**, Steklov Mathematical Institute, Moscow, Russia, CIS ► Transl. Russian: **G. Wassermann**, **R. Thomas**

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3rd, rev. and exp. ed. 1992. 2nd printing 2004. XIII, 150 p. 87 illus. Softcover  
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## Mathematical Methods of Classical Mechanics

This book constructs the mathematical apparatus of classical mechanics from the beginning, examining basic problems in dynamics like the theory of oscillations and the Hamiltonian formalism. The author emphasizes geometrical considerations and includes phase spaces and flows, vector fields, and Lie groups. Discussion includes qualitative methods of the theory of dynamical systems and of asymptotic methods like averaging and adiabatic invariance.

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V. Arnold, Steklov Mathematical Institute, Moscow, Russia; V. Goryunov, The University of Liverpool, UK; O. Lyashko, Airforce Engineering Academy, Moscow, Russia; V. Vasil'ev, Steklov Mathematical Institute, Moscow, Russia ▶ Transl. Russian: A. Iacob

### Singularity Theory I

This is a compact guide to the principles and main applications of Singularity Theory by one of the world's top research groups. It includes a number of new results as well as a carefully prepared and extensive bibliography that makes it easy to find the necessary details. It's ideal for any mathematician or physicist interested in modern mathematical analysis.

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V. I. Arnold, Steklov Mathematical Institute, Moscow, Russia ▶ Translated by: R. Cooke

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This richly-illustrated text covers the Cauchy and Neumann problems for the classical linear equations of mathematical physics. Many problems are sprinkled throughout the text, and a full set of problems from examinations given in Moscow are included at the end. What makes the book unique is Arnold's new and fresh perspective, his ability to blow away the fog of generality and reveal the essentially simple, intuitive ideas underlying a subject.

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► Originally published as a monograph with the title: Fundamentals of Contemporary Set Theory

2nd ed. 1993. Corr. 2nd printing 1994. (Undergraduate Texts in Mathematics) Hardcover  
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R. S. Liptser, University of Tel Aviv, Israel;  
A. N. Shiryaev, Steklov Mathematical Institute, Moscow, Russia ► Transl. Russian: B. Aries

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These volumes cover non-linear filtering (prediction and smoothing) theory and its applications to the problem of optimal estimation, control with incomplete data, information theory, and sequential testing of hypothesis. Also presented is the theory of martingales, of interest to those who deal with problems in financial mathematics. These editions include new material, expanded chapters, and comments on recent progress in the field.

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F. Lorenz, University of Münster, Germany

► Translated by: S. Levy

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L. Lovász, Microsoft Research, Redmond, WA, USA; J. Pelikán, Eötvös Loránd University, Budapest, Hungary; K. Vesztegombi, University of Washington, Seattle, WA, USA

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Aimed at undergraduate mathematics and computer science students, this book is an excellent introduction to a lot of problems of discrete mathematics. It discusses a number of selected results and methods, mostly from areas of combinatorics and graph theory, and it uses proofs and problem solving to help students understand the solutions to problems. Numerous examples, figures, and exercises are spread throughout the book.

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1st ed. 2004. Corr. 2nd printing 2005. X, 552 p.  
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**B. B. Mandelbrot**, Yale University, New Haven, CT, USA ▶ Co author: **C. Evertsz**, **M. Gutzwiller**  
▶ Foreword by: **P. Jones**

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Just 23 years ago Benoit Mandelbrot published his famous picture of the Mandelbrot set, but that picture has changed our view of the mathematical and physical universe. In this text, Mandelbrot offers 25 papers from the past 25 years, many related to the famous inkblot figure. Of historical interest are some early images of this fractal object produced with a crude dot-matrix printer. The text includes some items not previously published.

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## Fractals and Scaling In Finance

### Discontinuity, Concentration, Risk

Mandelbrot is world famous for his creation of the new mathematics of fractal geometry. Yet few people know that his original field of applied research was in econometrics and financial models, applying ideas of scaling and self-similarity to arrays of data generated by financial analyses. This book brings together his original papers as well as many original chapters specifically written for this book.

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This book surveys the modern state of number theory and continuing development trends of various branches in it. Topics discussed include non-Abelian generalizations of class field theory and recursive computability and Diophantine equations. This edition covers new ground such as Wiles' proof of Fermat's Last Theorem, arithmetical cohomology and noncommutative geometry, and the recent polynomial time algorithm for primality testing.

2nd ed. 2005. Corr. 2nd printing 2007. XVI, 514 p. 17 illus. (Encyclopaedia of Mathematical Sciences, Volume 49) Hardcover  
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## Number Fields

Requiring no more than a basic knowledge of abstract algebra, this text presents the mathematics of number fields in a straightforward, pedestrian manner. It therefore avoids local methods and presents proofs in a way that highlights the important parts of the arguments. Readers are assumed to be able to fill in the details, which in many places are left as exercises.

1st ed. 1977. Corr. 3rd printing 1995. VIII, 279 p. (Universitext) Softcover  
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▶ This book consists of parts of volume 56 and all of volume 70 of the series: Graduate Texts in Mathematics

1st ed. 1991. Corr. 3rd printing 1997. XVI, 428 p. 57 illus. (Graduate Texts in Mathematics, Volume 127) Hardcover  
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R. E. Megginson, University of Michigan, Ann Arbor, MI, USA

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## Combinatorial Commutative Algebra

This book provides an introduction to combinatorial commutative algebra with particular emphasis on combinatorial techniques for multigraded polynomial rings, semigroup algebras, and determined rings. The eighteen chapters cover topics ranging from homological invariants of monomial ideals and their polyhedral resolutions to hands-on tools for studying algebraic varieties with group actions. It contains over 100 figures and 250 exercises.

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T. Miyake, Hokkaido University, Sapporo, Japan

► Transl. Japanese: Y. Maeda

## Modular Forms

This book is a translation of the earlier book written by Koji Doi and the author, who revised it substantially for this English edition. It offers the basic knowledge of elliptic modular forms necessary to understand recent developments in number theory. It also treats the unit groups of quaternion algebras, rarely dealt with in books; and in the last chapter, Eisenstein series with parameter are discussed following the recent work of Shimura.

1st ed. 1989. Corr. 2nd printing 2006. IX, 335 p. 11 illus. (Springer Monographs in Mathematics) Hardcover  
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J. Monk

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1976. 548 p. (Graduate Texts in Mathematics, Volume 37) Hardcover  
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J. A. Muckstadt, Cornell University, Ithaca, NY, USA.

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D. Mumford, Harvard University, Cambridge, MA, USA; J. Fogarty, University of Massachusetts, Amherst, MA, USA; F. Kirwan, Balliol College, Oxford, UK

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3rd enlarged ed. 1994. 2nd printing 2002. XIV, 294 p. (Ergebnisse der Mathematik und ihrer Grenzgebiete. 2. Folge, Volume 34) Hardcover  
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## Problems in Algebraic Number Theory

While it is nearly impossible to answer how exactly one does mathematical research, it is no exaggeration to say that the ability to do it effectively lies in asking "well-posed" questions. This book is a collection of almost 500 problems in algebraic number theory, systematically arranged to reveal ideas and concepts in the evolution of the subject. This new edition includes an added chapter and several revised sections.

2nd ed. 2005. XVI, 352 p. (Graduate Texts in Mathematics, Volume 190) Hardcover  
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**J. Neukirch** ▶ Transl. German: **N. Schappacher**  
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This introduction to algebraic number theory discusses the classical concepts from the viewpoint of Arakelov theory. The treatment of class theory is particularly rich in illustrating complements, offering hints for further study, and providing concrete examples. It is the most up-to-date, systematic, and theoretically comprehensive textbook on algebraic number field theory available.

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▶ Originally published as volume 10 in the Series: Biomathematics

2nd ed. 2001. XX, 467 p. 134 illus. (Interdisciplinary Applied Mathematics, Volume 14) Hardcover  
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▶ Jointly published with Janos Bolyai Mathematical Society

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H. Peitgen, H. Jürgens, University of Bremen, Germany; D. Saupe, University of Konstanz, Germany

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This book covers the central ideas and concepts of chaos and fractals as well as many related topics including the Mandelbrot set, Julia sets, cellular automata, L-systems, percolation, and strange attractors. This new edition has been thoroughly revised throughout, and instead of focused computer programs in BASIC, it provides ten interactive JAVA-applets.

2nd ed. 2004. XIII, 864 p. 125 illus. Hardcover  
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M. Pettini, Osservatorio Astrofisico di Arcetri, Firenze, Italy

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B. Poizat, Universite Claude Bernard Lyon I, Villeurbanne, France ► Transl. French: M. Klein

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Translated from the French, this book is an introduction to first-order model theory. Starting from scratch, it quickly reaches the essentials, namely, the back-and-forth method and compactness, which are illustrated with examples taken from algebra. It also introduces logic via the study of the models of arithmetic, and it gives complete but accessible exposition of stability theory.

► Originally published with the title: Cours de Theorie des Modeles

2000. XXXI, 443 p. (Universitext) Hardcover  
ISBN ► 978-0-387-98655-5

#### List price

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Partial differential equations are fundamental to the modeling of natural phenomena. The desire to understand the solutions of these equations has always had a prominent place in the efforts of mathematicians and has inspired such diverse fields as complex function theory, functional analysis, and algebraic topology. This book, meant for a beginning graduate audience, provides a thorough introduction to partial differential equations.

2nd ed. 2004. XIV, 434 p. 21 illus. (Texts in Applied Mathematics, Volume 13) Hardcover  
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2003. XII, 362 p. 47 illus. Softcover  
ISBN ► 978-1-85233-552-6

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2000. XV, 437 p. 17 illus. (Graduate Texts in Mathematics, Volume 198) Hardcover  
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## Number Theory in Function Fields

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2002. XII, 358 p. (Graduate Texts in Mathematics, Volume 210) Hardcover  
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## Algebraic K-Theory and Its Applications

Algebraic K-Theory is crucial in many areas of modern mathematics, especially algebraic topology, number theory, algebraic geometry, and operator theory. This text is designed to help graduate students in other areas learn the basics of K-Theory and get a feel for its many applications. Topics include algebraic topology, homological algebra, algebraic number theory, and an introduction to cyclic homology and its interrelationship with K-Theory.

1st ed 1994. Corr. 2nd printing 1996. X, 392 p.  
2 illus. (Graduate Texts in Mathematics, Volume 147) Hardcover  
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Ideal for first year graduate students, this text provides an efficient exposition of Galois Theory with complete proofs and exercises. Topics covered include cubic and quartic formulas, insolvability of the quintic, and Galois's Great Theorem. This new edition, completely rewritten, now begins with a short section on symmetry groups of polygons in the plane. In addition, proofs are clearer, and several new theorems have been added.

2nd ed. 1998. Corr. 2nd printing 2001. XIV, 157 p.  
9 illus. (Universitext) Softcover  
ISBN ► 978-0-387-98541-1

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This textbook deals with tensors that are treated as vectors. Coverage details such new tensor concepts as the rotation of tensors, the transposer tensor, the eigentensors, and the permutation tensor structure. The book covers an existing gap between the classic theory of tensors and the possibility of solving tensor problems with a computer. A complementary computer package, written in Mathematica, is available through the Internet.

2005. XVI, 670 p. (Universitext) Softcover  
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Coverage includes a full treatment of the Grothendieck theory of tensor norms, approximation property and the Radon-Nikodym Property, Bochner and Pettis integrals. Each chapter contains worked examples and a set of exercises, and two appendices offer material on summability in Banach spaces and properties of spaces of measures.

2002. XIV, 225 p. 31 illus. (Springer Monographs in Mathematics) Hardcover  
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2nd ed. 2007. XXIV, 434 p. (Applied Mathematical Sciences, Volume 59) Hardcover  
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► Original edition published with the title: "Geometrical Methods in Robotics"

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2007. XII, 198 p. (Graduate Texts in Mathematics, Volume 235) Hardcover  
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### Theory and Applications

This book first provides a clear and concise introduction to the basic theory of matrices. It then goes on to give many interesting applications of matrices to different aspects of mathematics and also other areas of science and engineering. The book mixes together algebra, analysis, complexity theory, and numerical analysis.

2002. XV, 228 p. 2 illus. (Graduate Texts in Mathematics, Volume 216) Hardcover  
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J. Serre, College de France, Paris, France

▶ Transl. French: P. Ion

## Galois Cohomology

This is an updated English translation of Cohomologie Galoisienne, published more than thirty years ago as one of the very first versions of Lecture Notes in Mathematics. It includes a reproduction of an influential paper by R. Steinberg, together with some new material and an expanded bibliography.

▶ Originally published as a monograph

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J. Serre ▶ Transl. French: L. L. Scott

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▶ Title of the original French edition: Représentations linéaires des groupes finis

1st ed. 1977. Corr. 5th printing 1996. X, 170 p. (Graduate Texts in Mathematics, Volume 42) Hardcover  
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J. Serre, College de France, Paris, France

▶ Transl. French: J. Stilwell

## Trees

The seminal ideas of this book played a key role in the development of group theory since the 70s. Several generations of mathematicians learned geometric ideas in group theory from this book. In it, the author proves the fundamental theorem for the special cases of free groups and tree products before dealing with the proof of the general case. This new edition is ideal for graduate students and researchers in algebra, geometry and topology.

1st ed. 1980. Corr. 2nd printing 2003. IX, 142 p. (Springer Monographs in Mathematics) Hardcover  
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I. R. Shafarevich, Steklov Mathematical Institute, Moscow, Russia ▶ Transl. Russian: M. Reid

## Basic Algebraic Geometry 1

### Varieties in Projective Space

This book is a revised and expanded new edition of the first four chapters of Shafarevich's well-known introductory book on algebraic geometry. Besides correcting misprints and inaccuracies, the author has added plenty of new material, mostly concrete geometrical material such as Grassmannian varieties, plane cubic curves, the cubic surface, degenerations of quadrics and elliptic curves, the Bertini theorems, and normal surface singularities.

2nd rev. and exp. ed. 1994. XX, 304 p. Softcover  
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I. R. Shafarevich, A. I. Kostrikin, I. R. Shafarevich, Moscow, Russia (Eds.) ▶ Transl. Russian: M. Reid

## Basic Notions of Algebra

This book offers an extremely original and highly informative view on algebra and its place in modern mathematics and science. It shows how the origins of each algebraic concept can be related to attempts to model phenomena in physics or in other branches of mathematics, from the fields, commutative rings, and groups studied in every university math course through Lie groups and algebras to cohomology and category theory.

▶ 1st printing of this edition published as "Algebra I" by A. Kostrikin, I.R. Shafarevich (Eds.), Springer 1990.. Russian edition published by VINITI, Moscow 1986

1st ed. 1990. 3rd printing 2005. IV, 258 p. (Encyclopaedia of Mathematical Sciences, Volume 11) Hardcover  
ISBN ▶ 978-3-540-25177-4

#### List price

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## Solutions Manual for Lang's Linear Algebra

This solutions manual for Lang's Undergraduate Analysis provides worked-out solutions for all problems in the text. They include enough detail so that a student can fill in the intervening details between any pair of steps.

1996. XI, 200 p. 8 illus. Softcover  
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1st ed. 2002. 1st softcover printing 2003. VIII, 636 p. (Sources and Studies in the History of Mathematics and Physical Sciences) Softcover  
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1st ed. 1986. Corr. 3rd printing 1994. XII, 400 p. 13 illus. (Graduate Texts in Mathematics, Volume 106) Hardcover  
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In this text which gradually develops the tools for formulating and manipulating the field equations of Continuum Mechanics, the mathematics of tensor analysis is introduced in four, well-separated stages, and the physical interpretation and application of vectors and tensors are stressed throughout. This new edition contains more exercises. In addition, the author has appended a section on Differential Geometry.

2nd ed. 1994. 3rd corr. printing 1997. XIV, 112 p. 28 illus. (Undergraduate Texts in Mathematics) Hardcover  
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1st ed. 1998. Corr. 2nd printing 2000. XIV, 392 p. 85 illus. (Interdisciplinary Applied Mathematics, Volume 7) Hardcover  
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## Berkeley Problems in Mathematics

This book collects approximately nine hundred problems that have appeared on the preliminary exams in Berkeley over the last twenty years. It is an invaluable source of problems and solutions. Readers who work through this book will develop problem solving skills in such areas as real analysis, multivariable calculus, differential equations, metric spaces, complex analysis, algebra, and linear algebra.

3rd ed. 2004. XIV, 591 p. 42 illus. (Problem Books in Mathematics) Softcover  
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## Algebraic Topology

This book surveys the fundamental ideas of algebraic topology. The first part covers the fundamental group, its definition and application in the study of covering spaces. The second part turns to homology theory including cohomology, cup products, cohomology operations and topological manifolds. The final part is devoted to Homotopy theory, including basic facts about homotopy groups and applications to obstruction theory.

1st ed. 1981. Corr. 3rd printing 1995. XIV, 548 p. Softcover  
ISBN ► 978-0-387-94426-5

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2nd ed. 1976. 1st softcover printing 2001. XIII, 408 p. (Graduate Texts in Mathematics, Volume 34) Softcover  
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2003. XII, 254 p. 35 illus. (Undergraduate Texts in Mathematics) Hardcover  
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## Mathematics and Its History

This book offers a collection of historical essays detailing a large variety of mathematical disciplines and issues; it's accessible to a broad audience. This second edition includes new chapters on Chinese and Indian number theory, on hypercomplex numbers, and on algebraic number theory. Many more exercises have been added as well as commentary that helps place the exercises in context.

2nd ed. 2002. Corr. 2nd printing 2004. XVIII, 542 p. 181 illus. (Undergraduate Texts in Mathematics) Hardcover  
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J. Stoer, Institut für Angewandte Mathematik, Würzburg, Germany; R. Bulirsch, Institut für Mathematik, München, Germany  
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## Introduction to Numerical Analysis

This classic text combines modern mathematical standards of numerical analysis with an understanding of the needs of computer scientists working on practical applications. This new edition features expanded presentation of Hermite interpolation and B-splines with a new section on multi-resolution methods and B-splines. It also includes a wealth of new information on differential equations and the iterative solution of linear equations.

3rd ed. 2002. XV, 768 p. 39 illus. (Texts in Applied Mathematics, Volume 12) Hardcover  
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L. Tartar, Carnegie Mellon University, Pittsburgh, PA, USA

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This text corresponds to a graduate mathematics course taught at Carnegie Mellon University in the spring of 1999. Included are comments added to the lecture notes, a bibliography containing 23 items, and brief biographical information for all scientists mentioned in the text, thus showing that the creation of scientific knowledge is an international enterprise.

2006. XXVIII, 247 p. (Lecture Notes of the Unione Matematica Italiana, Volume 1) Softcover  
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► Appendix von: P. Alexandroff

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