シュプリンガーのeBook
数学・統計学コレクション

キータイトル・カタログ

LNM	GTM	UTM	Grundlehren	UTX	STS
Lecture Notes in Mathematics	Graduate Texts in Mathematics — Robin Hartshorne Algebraic Geometry	Undergraduate Texts in Mathematics	Grundlehren der mathematischen Wissenschaften	Universitext	Springer Texts in Statistics

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シュプリンガーの数学・統計学プログラムの高度な学術性と業界最多のタイトル数

- 1840年代に遡る古典の復刻だけでなく、最新刊も電子化　• Birkhäuserなどのインプリントも網羅

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- 出版年別のパッケージ化により1タイトルあたりの金額が安価に　• 学生の教材費を軽減

数学・統計学 電子ブック・コレクション: 出版年別収録タイトル数 (英語コレクション)※ (2016年11月現在)

2005年	2006年	2007年	2008年	2009年	2010年	2011年	2012年	2013年	2014年	2015年	2016年	2017年予定
317	341	317	348	356	348	453	437	536	547	497	548	525

2004年以前アーカイブ・コレクション

| Vintage (1840-1989)	Modern (1990-1999)	Millennium (2000-2004)
2,989	2,665	1,708

※ 英語コレクションのほか、ドイツ語のコレクションも提供中

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著者の声

東京理科大学教授 東京理科大学理数教育センター長　秋山 仁先生

近著 Treks into Intuitive Geometryは、数学の「謎を解くワクワク」の過程を豊富なオリジナル・カラー図画とともに対話形式で表現したユニークな一冊です。http://bit.ly/1sbZJfP

その執筆の原動力、そして研究者として教育者として考える数学の魅力。さらに著作が電子化されたことによってもたらされる研究上、教育上の可能性について、3部に分けて語っていただきました。

実演含め、動画をお楽しみください。
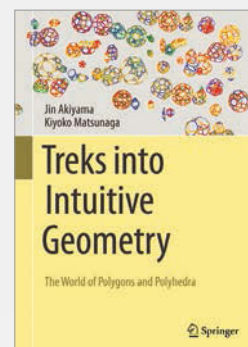
第1部 数学の面白さ、楽しさを語る

数学者・教育者として活躍される秋山先生が考える数学の醍醐味は謎解きのワクワク感。時代や価値観を超えて真実であり続ける美しさ…。続きはビデオで。

Please visit http://bit.ly/2l683K8

第2部 Treks into Intuitive Geometry の 執筆意図とは？

ユニークな近著 Treks into Intuitive Geometryを、謎解きを実演しつつご紹介頂きました。

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第3部 電子ブックが生む領域を超えた研究交流や 教育面でのメリット

著書が電子化されたことで領域を超えた研究交流が生まれ、また学生の費用負担を軽減できるなどの可能性を語ります。また先生に大きな影響を与えたという名著もご紹介。

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5	978-0-387-90613-3	Bott	Differential Forms in Algebraic Topology		1982	Graduate Texts in Mathematics
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Algebra
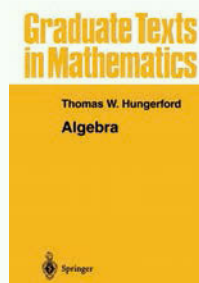
Th.W. Hungerford

Algebra

Algebra fulfills a definite need to provide a self-contained, one volume, graduate level algebra text that is readable by the average graduate student and flexible enough to accomodate a wide variety of instructors and course contents. The guiding philosophical principle throughout the text is that the material should be presented in the maximum usable generality consistent with good pedagogy. Therefore it is essentially self-contained, stresses clarity rather than brevity and contains an unusually large number of illustrative exercises. The book covers major areas of modern algebra, which is a necessity for most mathematics students in sufficient breadth and depth.

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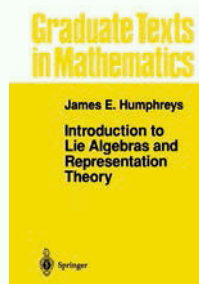
J. HUMPHREYS

Introduction to Lie Algebras and Representation Theory

This book is designed to introduce the reader to the theory of semisimple Lie algebras over an algebraically closed field of characteristic 0, with emphasis on representations. A good knowledge of linear algebra (including eigenvalues, bilinear forms, euclidean spaces, and tensor products of vector spaces) is presupposed, as well as some acquaintance with the methods of abstract algebra. The first four chapters might well be read by a bright undergraduate; however, the remaining three chapters are admittedly a little more demanding. Besides being useful in many parts of mathematics and physics, the theory of semi-

simple Lie algebras is inherently attractive, combining as it does a[...]

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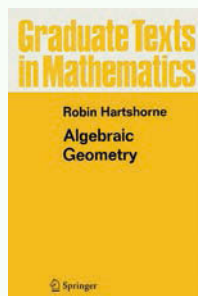
R. Hartshorne

Algebraic Geometry

Robin Hartshorne studied algebraic geometry with Oscar Zariski and David Mumford at Harvard, and with J.-P. Serre and A. Grothendieck in Paris. After receiving his Ph.D. from Princeton in 1963, Hartshorne became a Junior Fellow at Harvard, then taught there for several years. In 1972 he moved to California where he is now Professor at the University of California at Berkeley. He is the author of "Residues and Duality" (1966), "Foundations of Projective Geometry (1968), "Ample Subvarieties of Algebraic Varieties" (1970), and numerous research titles. His current research interest is the geometry of projective varieties and vector bundles. He has been a visiting professor at the College[...]

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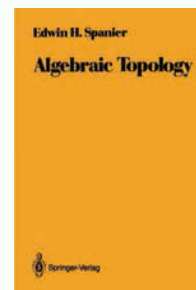
E.H. Spanier

Algebraic Topology

Intended for use both as a text and a reference, this book is an exposition of the fundamental ideas of algebraic topology. The first third of the book covers the fundamental group, its definition and its application in the study of covering spaces. The focus then turns to homology theory, including cohomology, cup products, cohomology operations, and topological manifolds. The remaining third of the book is devoted to Homotropy theory, covering basic facts about homotropy groups, applications to obstruction theory, and computations of homotropy groups of spheres. In the later parts, the main emphasis is on the application to geometry of the algebraic tools developed earlier.

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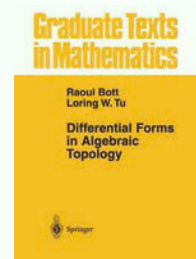
R. Bott, L.W. Tu

Differential Forms in Algebraic Topology

The guiding principle in this book is to use differential forms as an aid in exploring some of the less digestible aspects of algebraic topology. Accord ingly, we move primarily in the realm of smooth manifolds and use the de Rham theory as a prototype of all of cohomology. For applications to homotopy theory we also discuss by way of analogy cohomology with arbitrary coefficients. Although we have in mind an audience with prior exposure to algebraic or differential topology, for the most part a good knowledge of linear algebra, advanced calculus, and point-set topology should suffice. Some acquaintance with manifolds,

simplicial complexes, singular homology and coho-mology, and[...]

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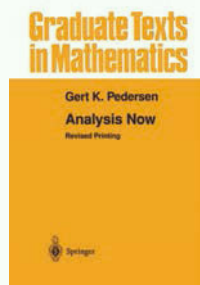
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1982. XIV, 338 p. (Graduate Texts in Mathematics, Vol. 82)
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Analysis

G.K. Pedersen

Analysis Now

Graduate students in mathematics, who want to travel light, will find this book invaluable; impatient young researchers in other fields will enjoy it as an instant reference to the highlights of modern analysis. Starting with general topology, it moves on to normed and seminormed linear spaces. From there it gives an introduction to the general theory of operators on Hilbert space, followed by a detailed exposition of the various forms the spectral theorem may take; from Gelfand theory, via spectral measures, to maximal commutative von Neumann algebras. The book concludes with two supplementary chapters: a concise account of unbounded operators and their spectral theory, and a[...]

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V.I. Arnol'd

Mathematical Methods of Classical Mechanics

In this text, the author constructs the mathematical apparatus of classical mechanics from the beginning, examining all the basic problems in dynamics, including the theory of oscillations, the theory of rigid body motion, and the Hamiltonian formalism. This modern approch, based on the theory of the geometry of manifolds, distinguishes iteself from the traditional approach of standard textbooks. Geometrical considerations are emphasized throughout and include phase spaces and flows, vector fields, and Lie groups. The work includes a detailed discussion of qualitative methods of the theory of dynamical systems and of asymptotic methods like perturbation techniques, averaging, and[...]

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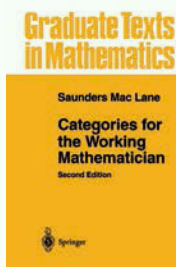
S. Mac Lane

Categories for the Working Mathematician

Categories for the Working Mathematician provides an array of general ideas useful in a wide variety of fields. Starting from the foundations, this book illuminates the concepts of category, functor, natural transformation, and duality. The book then turns to adjoint functors, which provide a description of universal constructions, an analysis of the representations of functors by sets of morphisms, and a means

of manipulating direct and inverse limits. These categorical concepts are extensively illustrated in the remaining chapters, which include many applications of the basic existence theorem for adjoint functors. The categories of algebraic systems are constructed from certain[...]

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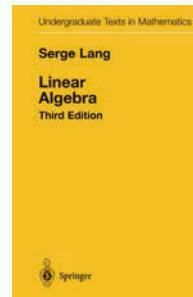
S. Lang

Linear Algebra

Linear Algebra is intended for a one-term course at the junior or senior level. It begins with an exposition of the basic theory of vector spaces and proceeds to explain the fundamental structure theorems for linear maps, including eigenvectors and eigenvalues, quadric and hermitian forms, diagonalization of symmetric, hermitian, and unitary linear maps and matrices, triangulation, and Jordan canonical form. The book also includes a useful chapter on convex sets and the finite-dimensional Krein-Milman theorem. The presentation is aimed at the student who has already had some exposure to the elementary theory of matrices, determinants, and linear maps. However, the book is logically[...]

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Mathematical Logic and Foundations

G. Takeuti, W.M. Zaring

Axiomatic Set Theory

This text deals with three basic techniques for constructing models of Zermelo-Fraenkel set theory: relative constructibility, Cohen's forcing, and Scott-Solovay's method of Boolean valued models. Our main concern will be the development of a unified theory that encompasses these techniques in one comprehensive framework. Consequently we will focus on certain funda mental and intrinsic relations between these methods of model construction. Extensive applications will not be treated here. This text is a continuation of our book, "I ntroduction to Axiomatic Set Theory," Springer-Verlag, 1971; indeed the two texts were originally planned as a single volume. The content of this volume is[...]

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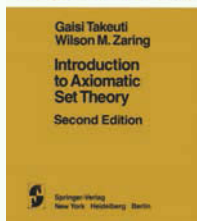
G. Takeuti, W.M. Zaring

Introduction to Axiomatic Set Theory

In 1963, the first author introduced a course in set theory at the University of Illinois whose main objectives were to cover Godel's work on the con sistency of the Axiom of Choice (AC) and the Generalized Continuum Hypothesis (GCH), and Cohen's work on the independence of the AC and the GCH. Notes taken in 1963 by the second author were taught by him in 1966, revised extensively, and are presented here as an introduction to axiomatic set theory. Texts in set theory frequently develop the subject rapidly

moving from key result to key result and suppressing many details. Advocates of the fast development claim at least two advantages. First, key results are highlighted, and second,[...]

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G. Shimura

Automorphic Functions and Number Theory

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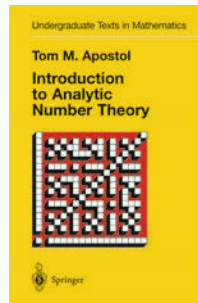
Number Theory

T.M. Apostol

Introduction to Analytic Number Theory

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K. Ito, T. Hida (Eds.)

Stochastic Processes and Their Applications

Proceedings of the International Conference held in Nagoya, July 2-6, 1985

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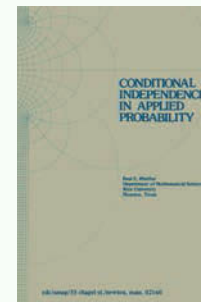
P.E. Pfeiffer

Conditional Independence in Applied Probability

It would be difficult to overestimate the importance of stochastic independence in both the theoretical development and the practical appli cations of mathematical probability. The concept is grounded in the idea that one event does not "condition" another, in the sense that occurrence of one does not affect the likelihood of the occurrence of the other. This leads to a formulation of the independence condition in terms of a simple "product rule," which is amazingly successful in capturing the essential ideas of independence. However, there are many patterns of "conditioning" encountered in practice which give rise to quasi independence conditions. Explicit and precise incorporation[...]

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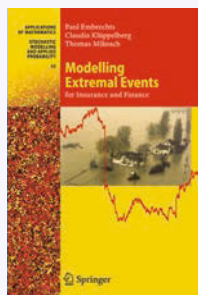
P. Embrechts, C. Klüppelberg, Th. Mikosch

Modelling Extremal Events
for Insurance and Finance

Both in insurance and in finance applications, questions involving extremal events (such as large insurance claims, large fluctuations in financial data, stock market shocks, risk management, ...) play an increasingly important role. This book sets out to bridge the gap between the existing theory and practical applications both from a probabilistic as well as from a statistical point of view. Whatever new theory is presented is always motivated by relevant real-life examples. The numerous illustrations and examples, and the extensive bibliography make this book an ideal reference text for students, teachers and users in the industry of extremal event methodology.

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G.C. Smith

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Algebraic Geometry
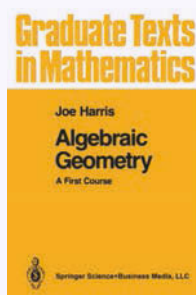
J. Harris

Algebraic Geometry
A First Course

This book is based on one-semester courses given at Harvard in 1984, at Brown in 1985, and at Harvard in 1988. It is intended to be, as the title suggests, a first introduction to the subject. Even so, a few words are in order about the purposes of the book. Algebraic geometry has developed tremendously over the last century. During the 19th century, the subject was practiced on a relatively concrete, down-to-earth level; the main objects of study were projective varieties, and the techniques for the most part were grounded in geometric constructions. This approach flourished during the middle of the century and reached its culmination in the work of the Italian school around the end[...]

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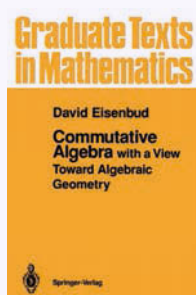
D. Eisenbud

Commutative Algebra
with a View Toward Algebraic Geometry

Commutative Algebra is best understood with knowledge of the geometric ideas that have played a great role in its formation, in short, with a view towards algebraic geometry. The author presents a comprehensive view of commutative algebra, from basics, such as localization and primary decomposition, through dimension theory, differentials, homologi-

and sharpen the theory and extended exercises give the reader an active part in complementing the material presented in the text. One novel feature is a chapter devoted to a quick[...]

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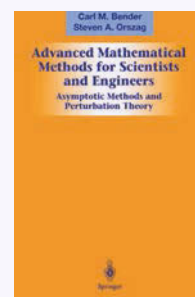
C.M. Bender, S.A. Orszag

Advanced Mathematical Methods for Scientists and Engineers I
Asymptotic Methods and Perturbation Theory

The triumphant vindication of bold theories-are these not the pride and justification of our life's work? -Sherlock Holmes, The Valley of Fear Sir Arthur Conan Doyle The main purpose of our book is to present and explain mathematical methods for obtaining approximate analytical solutions to differential and difference equations that cannot be solved exactly. Our objective is to help young and also established scientists and engineers to build the skills necessary to analyze equations that they encounter in their work. Our presentation is aimed at developing the insights and techniques that are most useful for attacking new problems. We do not emphasize special methods and tricks which[...]

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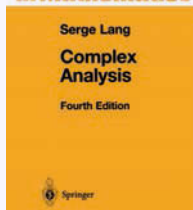
S. Lang

Complex Analysis

The present book is meant as a text for a course on complex analysis at the advanced undergraduate level, or first-year graduate level. The first half, more or less, can be used for a one-semester course addressed to undergraduates. The second half can be used for a second semester, at either level. Somewhat more material has been included than can be covered at leisure in one or two terms, to give opportunities for the instructor to exercise individual taste, and to lead the course in whatever directions strikes the instructor's fancy at the time as well as extra read ing material for students on their own. A large number of routine exer cises are included for the more stan-dard[...]

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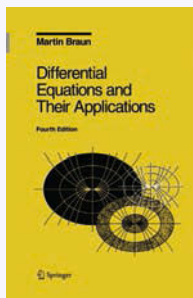
M. Braun

Differential Equations and Their Applications

An Introduction to Applied Mathematics

There are two major changes in the Fourth Edition of Differential Equations and Their Applications. The first concerns the computer programs in this text. In keeping with recent trends in computer science, we have replaced all the APL programs with Pascal and C programs. The Pascal programs appear in the text in place of the APL programs, where they are followed by the Fortran programs, while the C programs appear in Appendix C.Mathematics is play-ing an ever more important role in the physical and biological sciences, provoking a blurring of bound-aries between scientific disciplines and a resurgence

of interest in the modern as well as the classical tech-niques of applied mathematics.[...]

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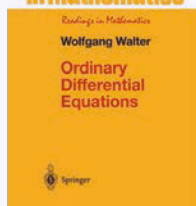
W. Walter

Ordinary Differential Equations

Develops the theory of initial-, boundary-, and eigenvalue problems, real and complex linear sys-tems, asymptotic behavior and stability. Using novel approaches to many subjects, the book emphasizes differential inequalities and treats more advanced top-ics such as Caratheodory theory, nonlinear bound-ary value problems and radially symmetric elliptic problems. New proofs are given which use concepts and methods from functional analysis. Applications from mechanics, physics, and biology are included, and exercises, which range from routine to demand-ing, are dispersed throughout the text. Solutions for selected exercises are included at the end of the book. All required material from[...]

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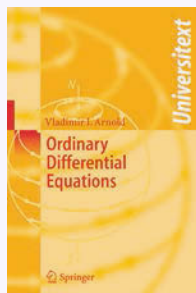
V.I. Arnold

Ordinary Differential Equations

The first two chapters of this book have been thor-oughly revised and sig nificantly expanded. Sections have been added on elementary methods of in tegra-tion (on homogeneous and inhomogeneous first-

order linear equations and on homogeneous and quasi-homogeneous equations), on first-order lin-ear and quasi-linear partial differential equations, on equations not solved for the derivative, and on Sturm's theorems on the zeros of second-order lin-ear equa tions. Thus the new edition contains all the questions of the current syllabus in the theory of ordinary differential equations. In discussing special devices for integration the author has tried through-out to lay bare the geometric[...]

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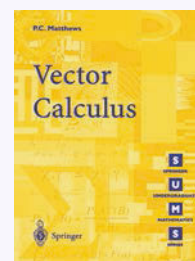
P.C. Matthews

Vector Calculus

Vector calculus is the fundamental language of math-ematical physics. It pro vides a way to describe phys-ical quantities in three-dimensional space and the way in which these quantities vary. Many topics in the physical sciences can be analysed mathemati-cally using the techniques of vector calculus. These top ics include fluid dynamics, solid mechanics and electromagnetism, all of which involve a description of vector and scalar quantities in three dimensions. This book assumes no previous knowledge of vectors. However, it is assumed that the reader has a knowl-edge of basic calculus, including differentiation, inte-gration and partial differentiation. Some knowledge of linear algebra[...]

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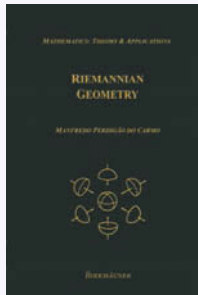
M. do Carmo

Riemannian Geometry

Riemannian Geometry is an expanded edition of a highly acclaimed and successful textbook (originally published in Portuguese) for first-year graduate students in mathematics and physics. The author's treatment goes very directly to the basic language of Riemannian geometry and immediately presents some of its most fundamental theorems. It is elementary, assuming only a modest background from readers, making it suitable for a wide variety of students and course structures. Its selection of topics has been deemed "superb" by teachers who have used the text. A significant feature of the book is its powerful and revealing structure, beginning simply with the definition of a differentiable[...]

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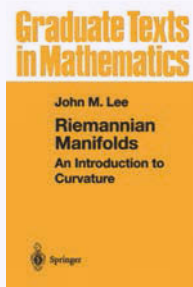
J.M. Lee

Riemannian Manifolds
An Introduction to Curvature

This book is designed as a textbook for a one-quarter or one-semester graduate course on Riemannian geometry, for students who are familiar with topological and differentiable manifolds. It focuses on developing an intimate acquaintance with the geometric meaning of curvature. In so doing, it introduces and

demonstrates the uses of all the main technical tools needed for a careful study of Riemannian manifolds. The author has selected a set of topics that can reasonably be covered in ten to fifteen weeks, instead of making any attempt to provide an encyclopedic treatment of the subject. The book begins with a careful treatment of the machinery of metrics, connections, and[...]

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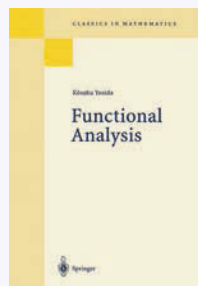
K. Yosida

Functional Analysis

The present book is based on lectures given by the author at the University of Tokyo during the past ten years. It is intended as a textbook to be studied by students on their own or to be used in a course on Functional Analysis, i. e. , the general theory of linear operators in function spaces together with salient features of its application to diverse fields of modern and classical analysis. Necessary prerequisites for the reading of this book are summarized, with or without proof, in Chapter 0 under titles: Set Theory, Topological Spaces, Measure Spaces and Linear Spaces. Then, starting with the chapter on Semi-norms, a general theory of Banach and Hilbert spaces is presented in[...]

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Number Theory

J. Neukirch

Algebraic Number Theory

From the review: "The present book has as its aim to resolve a discrepancy in the textbook literature and ... to provide a comprehensive introduction to algebraic number theory which is largely based on the modern, unifying conception of (one-dimensional) arithmetic algebraic geometry. ... Despite this exacting program, the book remains an introduction to algebraic number theory for the beginner... The author discusses the classical concepts from the viewpoint of Arakelov theory.... The treatment of class field theory is ... particularly rich in illustrating complements, hints for further study, and concrete examples.... The concluding chapter VII on zeta-functions and L-series is[...]

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2nd Edition
S. Lang

Algebraic Number Theory

The present book gives an exposition of the classical basic algebraic and analytic number theory and supersedes my Algebraic Numbers, including much more material, e. g. the class field theory on which 1 make further comments at the appropriate place later. For different points of view, the reader is encouraged to read the collec tion of papers from the Brighton Symposium (edited by Cassels-Frohlich), the Artin-Tate notes on class field theory, Weil's book on Basic Number Theory, Borevich-Shafarevich's Number Theory, and also older books like those of W eber, Hasse, Hecke, and Hilbert's Zahlbericht. It seems that over the years, everything that has been done has proved useful, theo[...]

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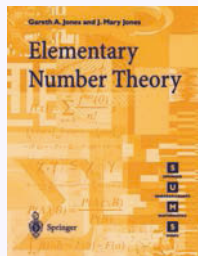
G.A. Jones, J.M. Jones

Elementary Number Theory

Our intention in writing this book is to give an elementary introduction to number theory which does not demand a great deal of mathematical back ground or maturity from the reader, and which can be read and understood with no extra assistance. Our first three chapters are based almost entirely on A-level mathematics, while the next five require little else beyond some el ementary group theory. It is only in the last three chapters, where we treat more advanced topics, including recent developments, that we require greater mathematical background; here we use some basic ideas which students would expect to meet in the first year or so of a typical undergraduate course in math[...]

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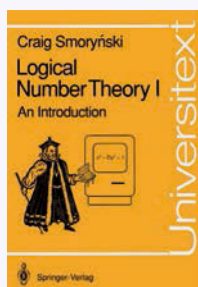
C. Smorynski

Logical Number Theory I
An Introduction

Number theory as studied by the logician is the subject matter of the book. This first volume can stand on its own as a somewhat unorthodox introduction to mathematical logic for undergraduates, dealing with the usual introductory material: recursion theory, first-order logic, completeness, incompleteness, and undecidability. In addition, its second chapter contains the most complete logical discussion of Diophantine Decision Problems available anywhere, tak-

ing the reader right up to the frontiers of research (yet remaining accessible to the undergraduate). The first and third chapters also offer greater depth and breadth in logico-arithmetical matters than can be found in existing[...]

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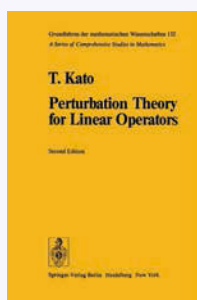
T. Kato

Perturbation Theory for Linear Operators

In view of recent development in perturbation theory, supplementary notes and a supplementary bibliography are added at the end of the new edition. Little change has been made in the text except that the para graphs V-§ 4.5, VI-§ 4.3, and VIII-§ 1.4 have been completely rewritten, and a number of minor errors, mostly typographical, have been corrected. The author would like to thank many readers who brought the errors to his attention. Due to these changes, some theorems, lemmas, and formulas of the first edition are missing from the new edition while new ones are added. The new ones have numbers different from those attached to the old ones which they may have replaced. Despite[...]

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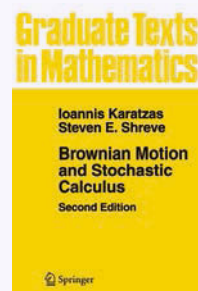
I. Karatzas, S. Shreve

Brownian Motion and Stochastic Calculus

This book is designed as a text for graduate courses in stochastic processes. It is written for readers familiar with measure-theoretic probability and discrete-time processes who wish to explore stochastic processes in continuous time. The vehicle chosen for this exposition is Brownian motion, which is presented as the canonical example of both a martingale and a Markov process with continuous paths. In this context, the theory of stochastic integration and stochastic calculus is developed. The power of this calculus is illustrated by results concerning representations of martingales and change of measure on Wiener space, and these in turn permit a presentation of recent advances in[...]

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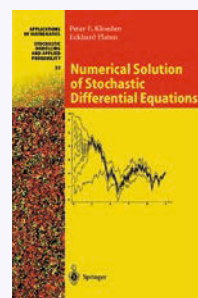
P.E. Kloeden, E. Platen

Numerical Solution of Stochastic Differential Equations

The aim of this book is to provide an accessible introduction to stochastic differ ential equations and their applications together with a systematic presentation of methods available for their numerical solution. During the past decade there has been an accelerating interest in the de velopment of numerical methods for stochastic differential equations (SDEs). This activity has been as strong in the engineering and physical

sciences as it has in mathematics, resulting inevitably in some duplication of effort due to an unfamiliarity with the developments in other disciplines. Much of the reported work has been motivated by the need to solve particular types of problems, for which,[...]

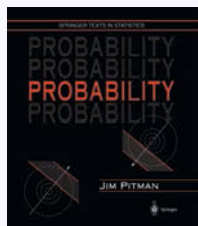More on www.springer.com/978-3-540-54062-5

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J. Pitman

Probability

This is a text for a one-quarter or one-semester course in probability, aimed at students who have done a year of calculus. The book is organised so a student can learn the fundamental ideas of probability from the first three chapters without reliance on calculus. Later chapters develop these ideas further using calculus tools. The book contains more than the usual number of examples worked out in detail.The most valuable thing for students to learn from a course like this is how to pick up a probability problem in a new setting and relate it to the standard body of theory. The more they see this happen in class, and the more they do it themselves in exercises, the better. The style[...]

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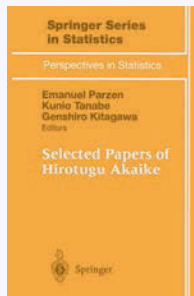
E. Parzen, K. Tanabe, G. Kitagawa (Eds.)

Selected Papers of Hirotugu Akaike

The pioneering research of Hirotugu Akaike has an international reputation for profoundly affecting how data and time series are analyzed and modelled and is highly regarded by the statistical and technological communities of Japan and the world. His 1974 paper "A new look at the statistical model identification" (IEEE Trans Automatic Control, AC-19, 716-723) is one of the most frequently cited papers in the area of engineering, technology, and applied sciences (according to a 1981 Citation Classic of the Institute of Scientific Information). It introduced the broad scientific community to model identification using the methods of Akaike's criterion AIC. The AIC method is cited and[...]

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Real Functions

R. Goldblatt

Lectures on the Hyperreals
An Introduction to Nonstandard Analysis

There are good reasons to believe that nonstandard analysis, in some version or other, will be the analysis of the future. KURT GODEL This book is a compilation and development of lecture notes written for a course on nonstandard analysis that I have now taught several times. Students taking the course have typically received previous introductions to standard real analysis and abstract algebra, but few have studied formal logic. Most of the notes have been used several times in class and revised in the light of that experience. The earlier chapters could be used as the basis of a course at the upper undergraduate level, but the work as a whole, including the later applications, may[...]

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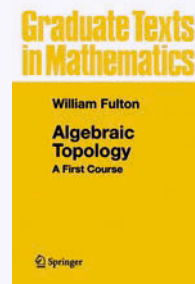
Topology

W. Fulton

Algebraic Topology
A First Course

To the Teacher. This book is designed to introduce a student to some of the important ideas of algebraic topology by emphasizing the relations of these ideas with other areas of mathematics. Rather than choosing one point of view of modem topology (homotopy theory, simplicial complexes, singular theory, axiomatic homology, differential topology, etc.), we concentrate our attention on concrete problems in low dimensions, introducing only as much algebraic machinery as necessary for the problems we meet. This makes it possible to see a wider variety of important features of the subject than is usual in a beginning text. The book is designed for students of mathematics or science[...]

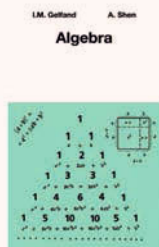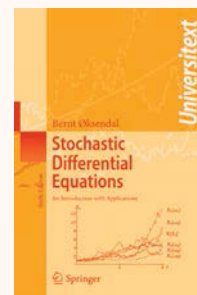More on www.springer.com/978-0-387-94327-5

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Algebra

I.M. Gelfand, A. Shen

Algebra

This book is about algebra. This is a very old science and its gems have lost their charm for us through everyday use. We have tried in this book to refresh them for you. The main part of the book is made up of problems. The best way to deal with them is: Solve the problem by yourself - compare your solution with the solution in the book (if it exists) - go to the next problem. However, if you have difficulties solving a problem (and some of them are quite difficult), you may read the hint or start to read the solution. If there is no solution in the book for some problem, you may skip it (it is not heavily used in the sequel) and return to it later. The book is divided into sections[...]

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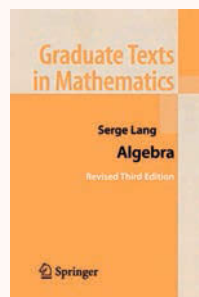
S. Lang

Algebra

From April 1999 Notices of the AMS, announcing that the author was awarded the Leroy P. Steele Prize for Mathematical Exposition for his many mathematics books: "Lang's Algebra changed the way graduate algebra is taught, retaining classical topics but introducing language and ways of thinking from cat-

has an impressive knack for presenting the important and interesting ideas of algebra in just the "right" way, and he never gets bogged down in the dry formalism which pervades some parts of algebra."This book is intended as a basic[...]

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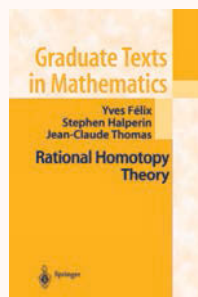
Y. Felix, S. Halperin, J.-C. Thomas

Rational Homotopy Theory

as well as by the list of open problems in the final section of this monograph. The computational power of rational homotopy theory is due to the discovery by Quillen [135] and by Sullivan [144] of an explicit algebraic formulation. In each case the rational homotopy type of a topological space is the same as the isomorphism class of its algebraic model and the rational homotopy type of a continuous map is the same as the algebraic homotopy class of the correspond ing morphism between models. These models make the rational homology and homotopy of a space transparent. They also (in principle, always, and in prac tice, sometimes) enable the calculation of other homotopy invariants[...]

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B. Øksendal

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An Introduction with Applications

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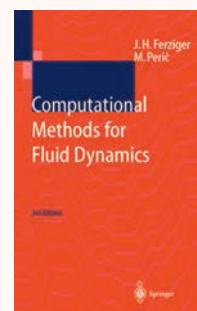
J.H. Ferziger, M. Peric

Computational Methods for Fluid Dynamics

In its 3rd revised and extended edition the book offers an overview of the techniques used to solve problems in fluid mechanics on computers and describes in detail those most often used in practice. Included are advanced methods in computational fluid dynamics, like direct and large-eddy simulation of turbulence, multigrid methods, parallel computing, moving grids, structured, block-structured and unstructured boundary-fitted grids, free surface flows. The 3rd edition contains a new section dealing with grid quality and an extended description of discretization methods. The book shows common roots and basic principles for many different methods. The book also contains a great deal of[...]

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P. Glasserman

Monte Carlo Methods in Financial Engineering

Monte Carlo simulation has become an essential tool in the pricing of derivative securities and in risk management. These applications have, in turn, stimulated research into new Monte Carlo methods and renewed interest in some older techniques. This book develops the use of Monte Carlo methods in finance and it also uses simulation as a vehicle for presenting models and ideas from financial engineering. It divides roughly into three parts. The first part develops the fundamentals of Monte Carlo methods, the foundations of derivatives pricing, and the implementation of several of the most important models used in financial engineering. The next part describes techniques for improving[...]

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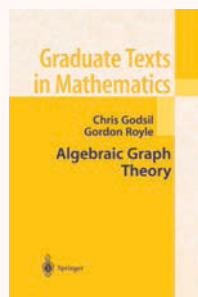
C. Godsil, G.F. Royle

Algebraic Graph Theory

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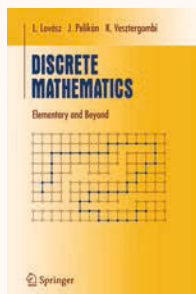
L. Lovász, J. Pelikán, K. Vesztergombi

Discrete Mathematics
Elementary and Beyond

Discrete mathematics is quickly becoming one of the most important areas of mathematical research, with applications to cryptography, linear programming, coding theory and the theory of computing. This book is aimed at undergraduate mathematics and computer science students interested in developing a feeling for what mathematics is all about, where mathematics can be helpful, and what kinds of questions mathematicians work on. The authors discuss a number of selected results and methods of discrete mathematics, mostly from the areas of combinatorics and graph theory, with a little number theory, probability, and combinatorial geometry. Wherever possible, the authors use[...]

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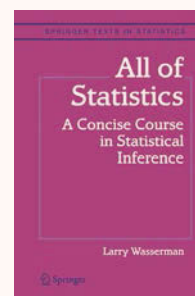
L. Wasserman

All of Statistics
A Concise Course in Statistical Inference

Taken literally, the title "All of Statistics" is an exaggeration. But in spirit, the title is apt, as the book does cover a much broader range of topics than a typical introductory book on mathematical statistics. This book is for people who want to learn probability and statistics quickly. It is suitable for graduate or advanced undergraduate students in computer science, mathematics, statistics, and related disciplines. The book includes modern topics like non-parametric curve estimation, bootstrapping, and classification, topics that are usually relegated to follow-up courses. The reader is presumed to know calculus and a little linear algebra. No previous knowledge of probability[...]

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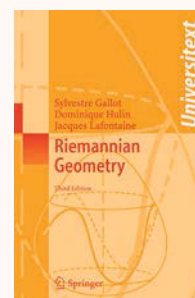
S. Gallot, D. Hulin, J. Lafontaine

Riemannian Geometry

Many years have passed since the ?rst edition. However, the encouragements of various readers and friends have persuaded us to write this third edition. During these years, Riemannian Geometry has undergone many dramatic - velopments. Here is not the place to relate them. The reader can consult for

instance the recent book [Br5]. of our "mentor" Marcel Berger. However, R- mannian Geometry is not only a fascinating ?eld in itself. It has proved to be a precious tool in other parts of mathematics. In this respect, we can quote the major breakthroughs in four-dimensional topology which occurred in the eighties and the nineties of the last century (see for instance [L2]). These have been[...]
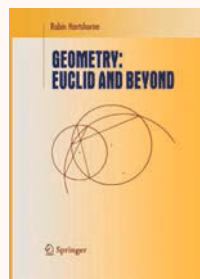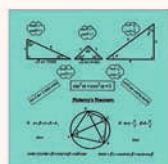
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Geometry

R. Hartshorne

Geometry: Euclid and Beyond

In recent years, I have been teaching a junior-senior-level course on the classi cal geometries. This book has grown out of that teaching experience. I assume only high-school geometry and some abstract algebra. The course begins in Chapter 1 with a critical examination of Euclid's Elements. Students are expected to read concurrently Books I-IV of Euclid's text, which must be obtained sepa rately. The remainder of the book is an exploration of questions that arise naturally from this reading, together with their modern answers. To shore up the foundations we use Hilbert's axioms. The Cartesian plane over a field provides an analytic model of the theory, and conversely, we see that[...]

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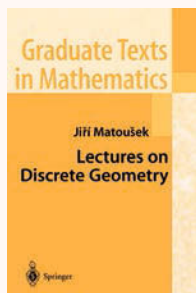
J. Matoušek

Lectures on Discrete Geometry

Discrete geometry investigates combinatorial properties of configurations of geometric objects. To a working mathematician or computer scientist, it offers sophisticated results and techniques of great diversity and it is a foundation for fields such as computational geometry or combinatorial optimization. This book is primarily a textbook introduction to various areas of discrete geometry. In each area, it explains several key results and methods, in an accessible and concrete manner. It also contains more advanced material in separate sections and thus it can serve as a collection of surveys in several narrower subfields. The main topics include: basics on convex sets, convex[...]

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I.M. Gelfand, M. Saul

Trigonometry

In a sense, trigonometry sits at the center of high school mathematics. It originates in the study of geometry when we investigate the ratios of sides in similar right triangles, or when we look at the relationship between a chord of a circle and its arc. It leads to a much deeper study of periodic functions, and of the so-called transcendental functions, which cannot be described using finite algebraic processes. It also has many applications to physics, astronomy, and other branches of science. It is a very old subject. Many of the geometric results that we now state in trigonometric terms were given a purely geometric

exposition by Euclid. Ptolemy, an early astronomer, began to go[...]

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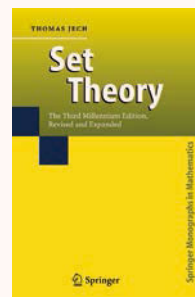
Th. Jech

Set Theory

The Third Millennium Edition, revised and expanded

Set Theory has experienced a rapid development in recent years, with major advances in forcing, inner models, large cardinals and descriptive set theory. The present book covers each of these areas, giving the reader an understanding of the ideas involved. It can be used for introductory students and is broad and deep enough to bring the reader near the boundaries of current research. Students and researchers in the field will find the book invaluable both as a study material and as a desktop reference.
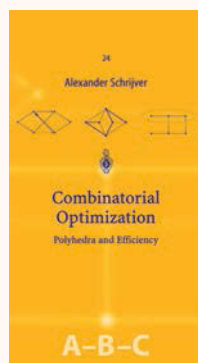
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A. Schrijver

Combinatorial Optimization
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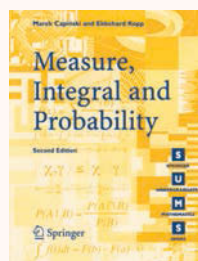
M. Capinski, P.E. Kopp

Measure, Integral and Probability

Measure, Integral and Probability is a gentle introduction that makes measure and integration theory accessible to the average third-year undergraduate student. The ideas are developed at an easy pace in a form that is suitable for self-study, with an emphasis on clear explanations and concrete examples rather than abstract theory. For this second edition, the text has been thoroughly revised and expanded. New features include: · a substantial new chapter, featuring a constructive proof of the Radon-Nikodym theorem, an analysis of the structure of Lebesgue-Stieltjes measures, the Hahn-Jordan decomposition, and a brief introduction to martingales · key aspects of financial[...]

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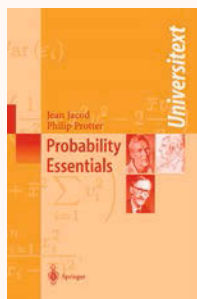
J. Jacod, P. Protter

Probability Essentials

We have made small changes throughout the book, including the exercises, and we have tried to correct if not all, then at least most of the typos. We wish to thank the many colleagues and students who have commented c- structively on the book since its publication two years ago, and in particular Professors Valentin Petrov, Esko Valkeila, Volker Priebe, and Frank Knight. Jean Jacod, Paris Philip Protter, Ithaca March, 2002 Preface to the Second Printing of the Second Edition We have bene?ted greatly from the long list of typos and small suggestions sent to us by Professor Luis Tenorio. These corrections have improved the book in subtle yet important ways, and the authors are most[...]

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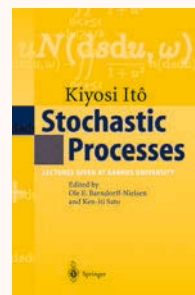
K. Ito
O.E. Barndorff-Nielsen, K.-i. Sato (Eds.)

Stochastic Processes
Lectures given at Aarhus University

The volume Stochastic Processes by K. Itö was published as No. 16 of Lecture Notes Series from Mathematics Institute, Aarhus University in August, 1969, based on Lectures given at that Institute during the academie year 1968 1969. The volume was as thick as 3.5 cm., mimeographed from typewritten manuscript and has been out of print for many years. Since its appearance, it has served, for those abIe to obtain one of the relatively few copies available, as a highly readable introduetion to basic parts of the theories of additive processes (processes with independent increments) and of Markov processes. It contains, in particular, a clear and detailed exposition of the Lévy-It ö[...]
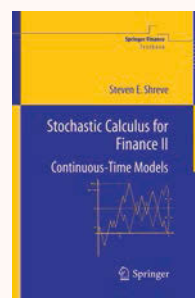
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Quantitative Finance

S. Shreve

Stochastic Calculus for Finance II
Continuous-Time Models

Stochastic Calculus for Finance evolved from the first ten years of the Carnegie Mellon Professional Master's program in Computational Finance. The content of this book has been used successfully with students whose mathematics background consists of calculus and calculus-based probability. The text gives both precise statements of results, plausibility arguments, and even some proofs, but more importantly intuitive explanations developed and refine through classroom

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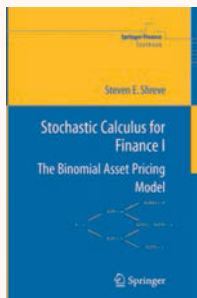ISBN 978-0-387-40101-0
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The Binomial Asset Pricing Model

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Topological Groups, Lie Groups
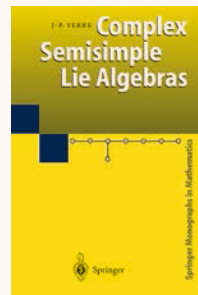
J.-P. Serre

Complex Semisimple Lie Algebras

These notes are a record of a course given in Algiers from 10th to 21st May, 1965. Their contents are as follows. The first two chapters are a summary, without proofs, of the general properties of nilpotent, solvable, and semisimple Lie algebras. These are well-known results, for which the reader can refer to, for example, Chapter I of Bourbaki or my Harvard notes. The theory of complex semisimple algebras occupies Chapters III and IV. The proofs of the main theorems are essentially complete; however, I have also found it useful to mention some complementary results without proof. These are indicated by an asterisk, and the proofs can be found in Bourbaki, Groupes et Algebres de Lie,[...]

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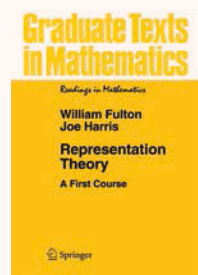
W. Fulton, J. Harris

Representation Theory
A First Course

The primary goal of these lectures is to introduce a beginner to the finite dimensional representations of Lie groups and Lie algebras. Since this goal is shared by quite a few other books, we should explain in this Preface how our approach differs, although the potential reader can probably see this better by a quick browse through the book. Representation theory is simple to define: it is the study of the ways in which a given group may act on vector spaces. It is almost certainly unique, however, among such clearly delineated subjects, in the breadth of its interest to mathemati-

cians. This is not surprising: group actions are ubiquitous in 20th century mathematics, and where the[...]

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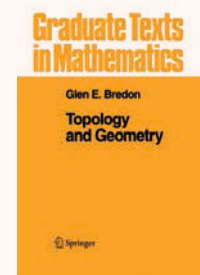
Topology

G.E. Bredon

Topology and Geometry

The golden age of mathematics-that was not the age of Euclid, it is ours. C. J. KEYSER This time of writing is the hundredth anniversary of the publication (1892) of Poincare's first note on topology, which arguably marks the beginning of the subject of algebraic, or "combinatorial," topology. There was earlier scattered work by Euler, Listing (who coined the word "topology"), Mobius and his band, Riemann, Klein, and Betti. Indeed, even as early as 1679, Leibniz indicated the desirability of creating a geometry of the topological type. The establishment of topology (or "analysis situs" as it was often called at the time) as a coherent theory, however, belongs to Poincare. Curiously,[...]

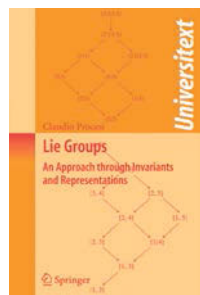More on www.springer.com/978-0-387-97926-7

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C. Procesi

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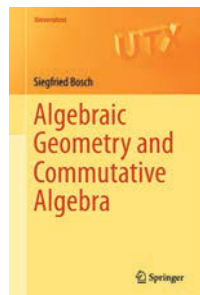
S. Bosch

Algebraic Geometry and Commutative Algebra

late 1950s allowed the application of algebraic-geometric methods in fields that formerly seemed to be far away from geometry, like algebraic number theory. The new techniques paved the way to spectacular progress such as the proof of Fermat's Last Theorem by Wiles and Taylor.The scheme-theoretic approach to algebraic geometry is explained for non-experts. More advanced readers can use the book to broaden their view on the subject.[...]

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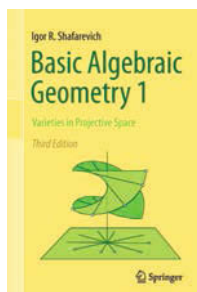
I.R. Shafarevich

Basic Algebraic Geometry 1
Varieties in Projective Space

Shafarevich's Basic Algebraic Geometry has been a classic and universally used introduction to the subject since its first appearance over 40 years ago. As the translator writes in a prefatory note, ``For all [advanced undergraduate and beginning graduate] students, and for the many specialists in other branches of math who need a liberal education in algebraic geometry, Shafarevich's book is a must.'' The third edition, in addition to some minor corrections, now offers a new treatment of the Riemann--Roch theorem for curves, including a proof from first principles.Shafarevich's book is an attractive and accessible introduction to algebraic geometry, suitable for beginning students[...]

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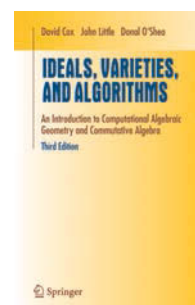
D.A. Cox, J. Little, D. O'Shea

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Algebraic Geometry is the study of systems of polynomial equations in one or more variables, asking such questions as: Does the system have finitely many solutions, and if so how can one find them? And if there are infinitely many solutions, how can they be described and manipulated? The solutions of a system of polynomial equations form a geometric object called a variety; the corresponding algebraic object is an ideal. There is a close relationship between ideals and varieties which reveals the intimate link between algebra and geometry. Written at a level appropriate to undergraduates, this book covers such topics as the Hilbert Basis Theorem, the Nullstellensatz, invariant[...]
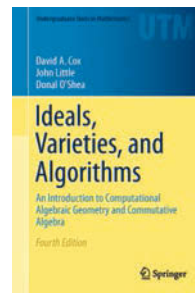
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This text covers topics in algebraic geometry and commutative algebra with a strong perspective toward practical and computational aspects. The first four chapters form the core of the book. A comprehensive chart in the Preface illustrates a variety of ways to proceed with the material once these chapters are

largest revision incorporates a new Chapter (ten), which presents some of the essentials of progress made over the last[...]
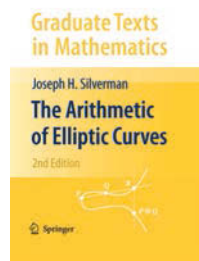
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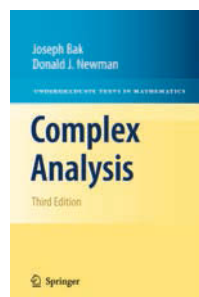
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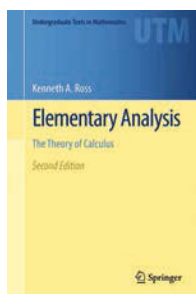
K.A. Ross

Elementary Analysis
The Theory of Calculus

For over three decades, this best-selling classic has been used by thousands of students in the United States and abroad as a must-have textbook for a transitional course from calculus to analysis. It has proven to be very useful for mathematics majors who have no previous experience with rigorous proofs. Its friendly style unlocks the mystery of writing proofs, while carefully examining the theoretical basis for calculus. Proofs are given in full, and the large number of well-chosen examples and exercises range from routine to challenging.The second edition preserves the book's clear and concise style, illuminating discussions, and simple, well-motivated proofs. New topics include[...]

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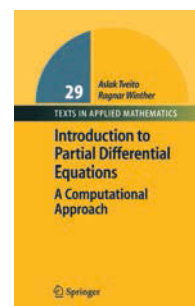
A. Tveito, R. Winther

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Mathematics is playing an ever more important role in the physical and biological sciences, provoking a blurring of boundaries between scientific disciplines and a resurgence of interest in the modern as well as the cl- sical techniques of applied mathematics. This renewal of interest, both in research and teaching, has led to the establishment of the series: Texts in Applied Mathematics (TAM). The development of new courses is a natural consequence of a high level of excitement on the research frontier as newer techniques, such as numerical and symbolic computer systems, dynamical systems, and chaos mix with and reinforce the traditional methods of applied mathematics. Thus, the[...]
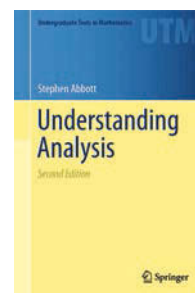
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S. Abbott

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the student is much better prepared to understand what[...]

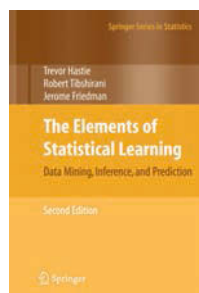More on www.springer.com/978-1-4939-2711-1

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T. Hastie, R. Tibshirani, J. Friedman

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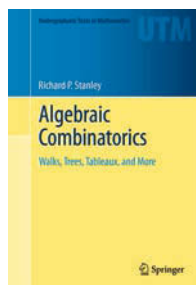
R. Stanley

Algebraic Combinatorics
Walks, Trees, Tableaux, and More

Written by one of the foremost experts in the field, Algebraic Combinatorics is a unique undergraduate textbook that will prepare the next generation of pure and applied mathematicians. The combination of the author's extensive knowledge of combinatorics and classical and practical tools from algebra will inspire motivated students to delve deeply into the fascinating interplay between algebra and combinatorics. Readers will be able to apply their newfound knowledge to mathematical, engineering, and business models. The text is primarily intended for use in a one-semester advanced undergraduate course in algebraic combinatorics, enumerative combinatorics, or graph theory.[...]

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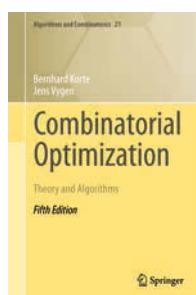
B. Korte, J. Vygen

Combinatorial Optimization
Theory and Algorithms

This comprehensive textbook on combinatorial optimization places special emphasis on theoretical results and algorithms with provably good performance, in contrast to heuristics. It is based on numerous courses on combinatorial optimization and specialized topics, mostly at graduate level. This book reviews the fundamentals, covers the classical topics (paths, flows, matching, matroids, NP-completeness, approximation algorithms) in detail, and proceeds to advanced and recent topics, some of which have not appeared in a textbook before. Throughout, it contains complete

but concise proofs, and also provides numerous exercises and references. This fifth edition has again been updated,[...]
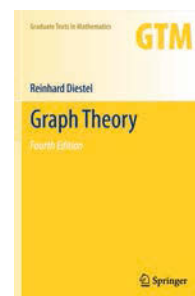
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R. Diestel

Graph Theory

Almosttwodecadeshavepassedsincetheappearanceofthosegrapht- ory texts that still set the agenda for most introductory courses taught today. The canon created by those books has helped to identify some main? eldsofstudyandresearch,andwilldoubtlesscontinuetoin? uence the development of the discipline for some time to come. Yet much has happened in those 20 years, in graph theory no less thanelsewhere: deepnewtheoremshavebeenfound,seeminglydisparate methods and results have become interrelated, entire new branches have arisen. To name just a few such developments, one may think of how the new notion of list colouring has bridged the gulf between invariants such as average degree and[...]

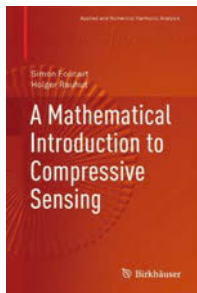More on www.springer.com/978-3-642-14278-9

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S. Foucart, H. Rauhut

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At the intersection of mathematics, engineering, and computer science sits the thriving field of compressive sensing. Based on the premise that data acquisition and compression can be performed simultaneously, compressive sensing finds applications in imaging, signal processing, and many other domains. In the areas of applied mathematics, electrical engineering, and theoretical computer science, an explosion of research activity has already followed the theoretical results that highlighted the efficiency of the basic principles. The elegant ideas behind these principles are also of independent interest to pure mathematicians.A Mathematical Introduction to Compressive Sensing gives a[...]

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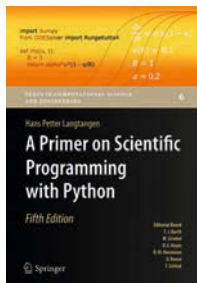
H.P. Langtangen

A Primer on Scientific Programming with Python

The book serves as a first introduction to computer programming of scientific applications, using the high-level Python language. The exposition is exam-ple and problem-oriented, where the applications are taken from mathematics, numerical calculus, statistics, physics, biology and finance. The book teaches "Matlab-style" and procedural programming as well as object-oriented programming. High school mathematics is a required background and it is advantageous to study classical and numerical one-variable calculus in parallel with reading this book. Besides learning how to program computers, the reader will also learn how to solve mathematical problems, arising in various branches of[...]

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H.P. Langtangen

Python Scripting for Computational Science

Numerous readers of the second edition have noti?ed me about misprints and possible improvements of the text and the associated computer codes. The resulting modi?cations have been incorporated in this new edition and its accompanying software. The major change between the second and third editions, however, is caused by the new implementation of Numerical Python, now called numpy. The new numpy package encourages a slightly di?erent syntax compared to the old Numeric implementation, which was used in the previous editions. Since Numerical Python functionality appears in a lot of places in the book, there are hence a huge number of updates to the new suggested numpy syntax, especially[...]

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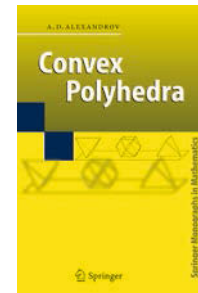
A.D. Alexandrov

Convex Polyhedra

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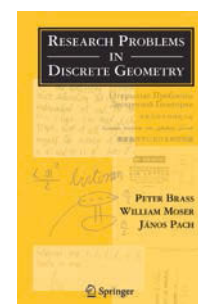
P. Brass, W.O.J. Moser, J. Pach

Research Problems in Discrete Geometry

Although discrete geometry has a rich history extending more than 150 years, it abounds in open problems that even a high-school student can understand and appreciate. Some of these problems are notoriously difficult and are intimately related to deep questions in other fields of mathematics. But many problems, even old ones, can be solved by a clever undergraduate or a high-school student equipped with an ingenious idea and the kinds of skills used in a mathematical olympiad. Research Problems in Discrete Geometry is the result of a 25-year-old project

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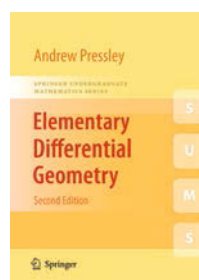More on www.springer.com/978-0-387-23815-9

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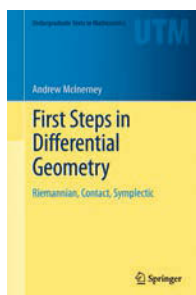
A. McInerney

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Riemannian, Contact, Symplectic

Differential geometry arguably offers the smoothest transition from the standard university mathematics sequence of the first four semesters in calculus, linear algebra, and differential equations to the higher levels of abstraction and proof encountered at the upper division by mathematics majors. Today it is possible to describe differential geometry as "the study of structures on the tangent space," and this text develops this point of view. This book, unlike other introductory texts in differential geometry, develops the architecture necessary to introduce symplectic and contact geometry alongside its Riemannian cousin. The main goal of this book is to bring the undergraduate[...]

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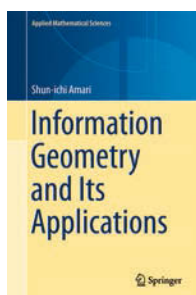
S.-i. Amari

Information Geometry and Its Applications

This is the first comprehensive book on information geometry, written by the founder of the field. It begins with an elementary introduction to dualistic geometry and proceeds to a wide range of applications, covering information science, engineering, and neuroscience. It consists of four parts, which on the whole can be read independently. A manifold with a divergence function is first introduced, leading directly to dualistic structure, the heart of information geometry. This part (Part I) can be apprehended without any knowledge of differential geometry. An intuitive explana-

tion of modern differential geometry then follows in Part II, although the book is for the most part[...]
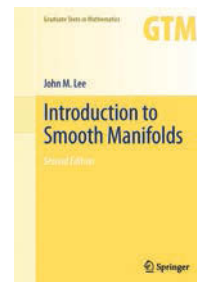
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This book is an introductory graduate-level textbook on the theory of smooth manifolds. Its goal is to familiarize students with the tools they will need in order to use manifolds in mathematical or scientific research--- smooth structures, tangent vectors and covectors, vector bundles, immersed and embedded submanifolds, tensors, differential forms, de Rham cohomology, vector fields, flows, foliations, Lie derivatives, Lie groups, Lie algebras, and more. The approach is as concrete as possible, with pictures and intuitive discussions of how one should think geometrically about the abstract concepts, while making full use of the powerful tools that modern mathematics has to offer.This[...]
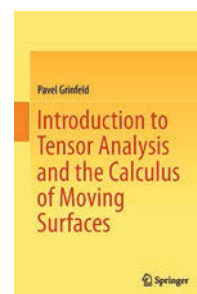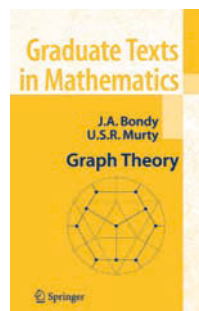
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P. Grinfeld

Introduction to Tensor Analysis and the Calculus of Moving Surfaces

This textbook is distinguished from other texts on the subject by the depth of the presentation and

the discussion of the calculus of moving surfaces, which is an extension of tensor calculus to deforming manifolds. Designed for advanced undergraduate and graduate students, this text invites its audience to take a fresh look at previously learned material through the prism of tensor calculus. Once the framework is mastered, the student is introduced to new material which includes differential geometry on manifolds, shape optimization, boundary perturbation and dynamic fluid film equations. The language of tensors, originally championed by Einstein, is as fundamental as the languages[...]

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A. Bondy, U.S.R. Murty

Graph Theory

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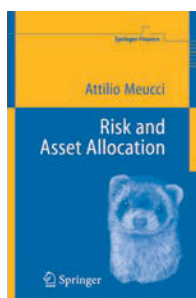
A. Meucci

Risk and Asset Allocation

This encyclopedic, detailed exposition spans all the steps of one-period allocation from the foundations to the most advanced developments. Multivariate estimation methods are analyzed in depth, including non-parametric, maximum-likelihood under non-normal hypotheses, shrinkage, robust, and very general Bayesian techniques. Evaluation methods such as stochastic dominance, expected utility, value at risk and coherent measures are thoroughly discussed in a unified setting and applied in a variety of contexts, including prospect theory, total return and benchmark allocation. Portfolio optimization is presented with emphasis on estimation risk, which is tackled by means of Bayesian,[...]

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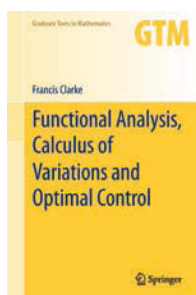
F. Clarke

Functional Analysis, Calculus of Variations and Optimal Control

Functional analysis owes much of its early impetus to problems that arise in the calculus of variations. In turn, the methods developed there have been applied to optimal control, an area that also requires new tools, such as nonsmooth analysis. This self-contained textbook gives a complete course on all these topics. It is written by a leading specialist who is also a noted expositor.This book provides a thorough introduction to functional analysis and includes many novel elements as well as the standard topics. A short course on nonsmooth analysis and geometry completes the first half of the book whilst the second half concerns the calculus of variations and optimal control. The[...]
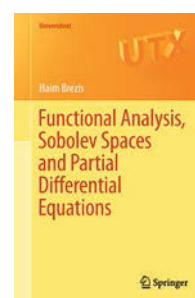
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H. Brezis

Functional Analysis, Sobolev Spaces and Partial Differential Equations

This textbook is a completely revised, updated, and expanded English edition of the important Analyse fonctionnelle (1983). In addition, it contains a wealth of problems and exercises (with solutions) to guide the reader. Uniquely, this book presents in a coherent, concise and unified way the main results from functional analysis together with the main results from the theory of partial differential equations (PDEs). Although there are many books on functional analysis and many on PDEs, this is the first to cover both of these closely connected topics. Since the French book was first published, it has been translated into Spanish, Italian, Japanese, Korean, Romanian, Greek and[...]

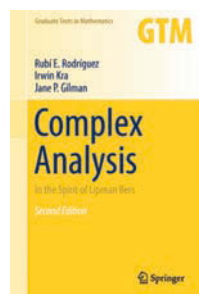More on www.springer.com/978-0-387-70913-0

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Functions of a Complex Variable

2ND EDITION

R. Rodriguez, I. Kra, J.P. Gilman

Complex Analysis

In the Spirit of Lipman Bers

This book is intended for a graduate course in complex analysis, where the main focus is the theory of complex-valued functions of a single complex variable. This theory is a prerequisite for the study of many areas of mathematics, including the theory of several finitely and infinitely many complex variables, hyperbolic geometry, two- and three-manifolds, and number theory. Complex analysis has connections and applications to many other subjects in mathematics and to other sciences. Thus this material will also be of interest to computer scientists, physicists, and engineers.The book covers most, if not all, of the material contained in Lipman Bers's courses on first year complex[...]

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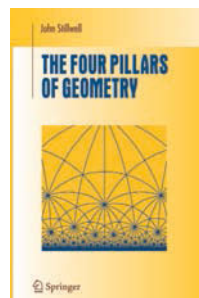
Geometry

J. Stillwell

The Four Pillars of Geometry

Many people think there is only one "right" way to teach geometry. For two millennia, the "right" way was Euclid's way, and it is still good in many respects. But in the 1950s the cry "Down with triangles!" was heard in France and new geometry books appeared,

packed with linear algebra but with no diagrams. Was this the new "right" way, or was the "right" way something else again, perhaps transformation groups? In this book, I wish to show that geometry can be developed in four fundamentally different ways, and that all should be used if the subject is to be shown in all its splendor. Euclid-style construction and axiomatics seem the best way to start, but linear algebra smooths the[...]

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History of Mathematics
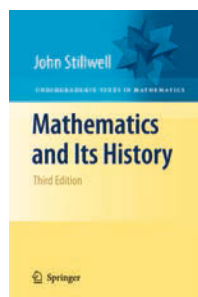
3RD EDITION

J. Stillwell

Mathematics and Its History

From the reviews of the second edition:"This book covers many interesting topics not usually covered in a present day undergraduate course, as well as certain basic topics such as the development of the calculus and the solution of polynomial equations. The fact that the topics are introduced in their historical contexts will enable students to better appreciate and understand the mathematical ideas involved...If one constructs a list of topics central to a history course, then they would closely resemble those chosen here."(David Parrott, Australian Mathematical Society)This third edition includes new chapters on simple groups and combinatorics, and new sections on several topics,[...]
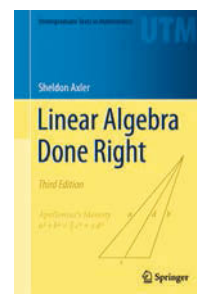
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Hardcover

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Linear and Multilinear Algebras, Matrix Theory

3RD EDITION

S. Axler

Linear Algebra Done Right

This best-selling textbook for a second course in linear algebra is aimed at undergrad math majors and graduate students. The novel approach taken here banishes determinants to the end of the book. The text focuses on the central goal of linear algebra: understanding the structure of linear operators on finite-dimensional vector spaces. The author has taken unusual care to motivate concepts and to simplify proofs. A variety of interesting exercises in each chapter helps students understand and manipulate the objects of linear algebra.The third edition contains major improvements and revisions throughout the book. More than 300 new exercises have been added since the previous edition.[...]
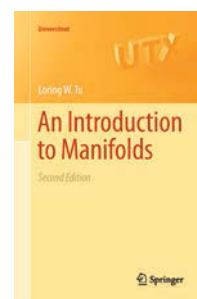
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Hardcover

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Manifolds and Cell Complexes (incl. Diff. Topology)

2ND EDITION

L.W. Tu

An Introduction to Manifolds

Manifolds, the higher-dimensional analogs of smooth curves and surfaces, are fundamental objects in modern mathematics. Combining aspects of algebra, topology, and analysis, manifolds have also been

applied to classical mechanics, general relativity, and quantum field theory. In this streamlined introduction to the subject, the theory of manifolds is presented with the aim of helping the reader achieve a rapid mastery of the essential topics. By the end of the book the reader should be able to compute, at least for simple spaces, one of the most basic topological invariants of a manifold, its de Rham cohomology. Along the way, the reader acquires the knowledge and skills necessary[...]
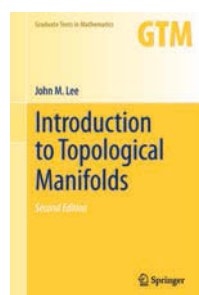
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J. Lee

Introduction to Topological Manifolds

This book is an introduction to manifolds at the beginning graduate level. It contains the essential topological ideas that are needed for the further study of manifolds, particularly in the context of differential geometry, algebraic topology, and related fields. Its guiding philosophy is to develop these ideas rigorously but economically, with minimal prerequisites and plenty of geometric intuition.Although this second edition has the same basic structure as the first edition, it has been extensively revised and clarified; not a single page has been left untouched. The major changes include a new introduction to CW complexes (replacing most of the material on simplicial complexes[...]

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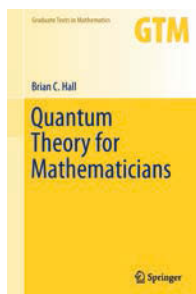
B. Hall

Quantum Theory for Mathematicians

Although ideas from quantum physics play an important role in many parts of modern mathematics, there are few books about quantum mechanics aimed at mathematicians. This book introduces the main ideas of quantum mechanics in language familiar to mathematicians. Readers with little prior exposure to physics will enjoy the book's conversational tone as they delve into such topics as the Hilbert space approach to quantum theory; the Schrödinger equation in one space dimension; the Spectral Theorem for bounded and unbounded self-adjoint operators; the Stone–von Neumann Theorem; the Wentzel–Kramers–Brillouin approximation; the role of Lie groups and Lie algebras in quantum mechanics; and[...]

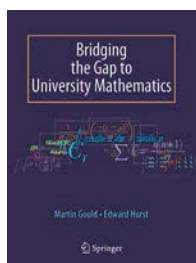More on www.springer.com/978-1-4614-7115-8

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Mathematics (general)

E. Hurst, M. Gould

Bridging the Gap to University Mathematics

Designed as an introduction to higher-education mathematics, Bridging the Gap is the only book of this sort written for students by students. The authors, Martin Gould and Edward Hurst, wrote this book as second-year undergraduates at Warwick University.

Their experiences as students have helped them create an approachable and comprehensive introductory text that will be of benefit to anyone looking to make the step-up to university education. This book contains chapters rich with worked examples and exercises covering all the key subject-areas that a first-year undergraduate will encounter, such as Inequalities, Complex Numbers, Probability, Matrices and many more. The authors have[...]

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J. Akiyama, M. Kano

Factors and Factorizations of Graphs
### Proof Techniques in Factor Theory

This book chronicles the development of graph factors and factorizations. It pursues a comprehensive approach, addressing most of the important results from hundreds of findings over the last century. One of the main themes is the observation that many theorems can be proved using only a few standard proof techniques. This stands in marked contrast to the seemingly countless, complex proof techniques offered by the extant body of papers and books. In addition to covering the history and development of this area, the book offers conjectures and discusses open problems. It also includes numerous explanatory figures that enable readers to progressively and intuitively understand the most[...]

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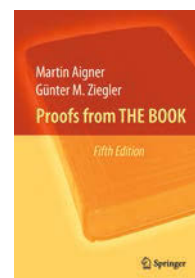
M. Aigner, G.M. Ziegler

Proofs from THE BOOK

This revised and enlarged fifth edition features four new chapters, which contain highly original and delightful proofs for classics such as the spectral theorem from linear algebra, some more recent jewels like the non-existence of the Borromean rings and other surprises.From the Reviews"... Inside PFTB (Proofs from The Book) is indeed a glimpse of mathematical heaven, where clever insights and beautiful ideas combine in astonishing and glorious ways. There is

vast wealth within its pages, one gem after another. ... Aigner and Ziegler... write: "... all we offer is the examples that we have selected, hoping that our readers will share our enthusiasm about brilliant ideas, clever[...]
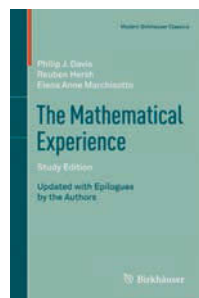
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############2#3###########

P. Davis, R. Hersh, E.A. Marchisotto

The Mathematical Experience, Study Edition

Winner of the 1983 National Book Award!"…a perfectly marvelous book about the Queen of Sciences, from which one will get a real feeling for what mathematicians do and who they are. The exposition is clear and full of wit and humor..." - The New Yorker (1983 National Book Award edition)Mathematics has been a human activity for thousands of years. Yet only a few people from the vast population of users are professional mathematicians, who create, teach, foster, and apply it in a variety of situations. The authors of this book believe that it should be possible for these professional mathematicians to explain to non-professionals what they do, what they say they are doing, and why the[...]

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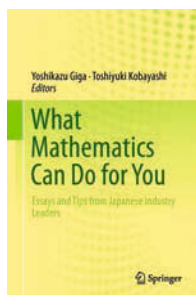
Y. Giga, T. Kobayashi (Eds.)

What Mathematics Can Do for You
Essays and Tips from Japanese Industry Leaders

Japan is a tiny country that occupies only 0.25% of the world's total land area. However, this small country is the world's third largest in economy: the Japanese GDP is roughly equivalent to the sum of any two major countries in Europe as of 2012.This book is a first attempt to ask leaders of top Japanese companies, such as Toyota, about their thoughts on mathematics. The topics range from mathematical problems in specific areas (e.g., exploration of natural resources, communication networks, finance) to mathematical strategy that helps a leader who has to weigh many different issues and make decisions in a timely manner, and even to mathematical literacy that ensures quality[...]

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Mathematics in Art and Architecture
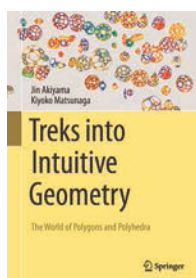
J. Akiyama, K. Matsunaga

Treks into Intuitive Geometry
The World of Polygons and Polyhedra

This book is written in a style that uncovers the mathematical theories buried in our everyday lives such as examples from patterns that appear in nature, art, and traditional crafts, and in mathematical mechanisms in techniques used by architects. The authors believe that through dialogues between students and mathematicians, readers may discover the processes by which the founders of the theories came to their various conclusions#their trials, errors, tribulations, and triumphs. The goal is for readers to refine their

mathematical sense of how to find good questions and how to grapple with these problems. Another aim is to provide enjoyment in the process of applying mathematical[...]
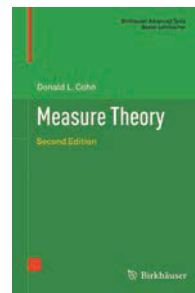
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Measure and Integration

D.L. Cohn

Measure Theory
Second Edition

Intended as a self-contained introduction to measure theory, this textbook also includes a comprehensive treatment of integration on locally compact Hausdorff spaces, the analytic and Borel subsets of Polish spaces, and Haar measures on locally compact groups. This second edition includes a chapter on measure-theoretic probability theory, plus brief treatments of the Banach-Tarski paradox, the Henstock-Kurzweil integral, the Daniell integral, and the existence of liftings. Measure Theory provides a solid background for study in both functional analysis and probability theory and is an excellent resource for advanced undergraduate and graduate students in mathematics. The prerequisites[...]
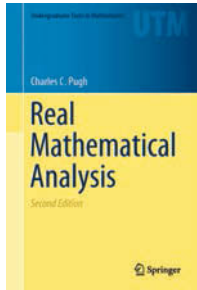
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C.C. Pugh

Real Mathematical Analysis

Based on an honors course taught by the author at UC Berkeley, this introduction to undergraduate real analysis gives a different emphasis by stressing the importance of pictures and hard problems. Topics include: a natural construction of the real numbers, four-dimensional visualization, basic point-set topology, function spaces, multivariable calculus via differential forms (leading to a simple proof of the Brouwer Fixed Point Theorem), and a pictorial treatment of Lebesgue theory. Over 150 detailed illustrations elucidate abstract concepts and salient points in proofs. The exposition is informal and relaxed, with many helpful asides, examples, some jokes, and occasional comments[...]

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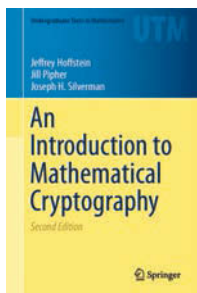
J. Hoffstein, J. Pipher, J.H. Silverman

An Introduction to Mathematical Cryptography

This self-contained introduction to modern cryptography emphasizes the mathematics behind the theory of public key cryptosystems and digital signature schemes. The book focuses on these key topics while developing the mathematical tools needed for the construction and security analysis of diverse cryptosystems. Only basic linear algebra is required of the reader; techniques from algebra, number theory, and probability are introduced and developed as required. This text provides an ideal introduction for mathe-matics and computer science students to the mathematical foundations of modern cryptography. The book includes an extensive bibliography and index; supplementary materials are[...]

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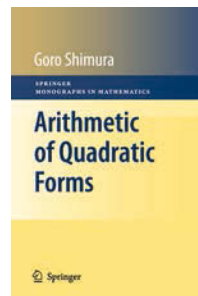
G. Shimura

Arithmetic of Quadratic Forms

This book can be divided into two parts. The ?rst part is preliminary and consists of algebraic number theory and the theory of semisimple algebras. The raison d'ˆ etre of the book is in the second part, and so let us ?rst explain the contents of the second part. There are two principal topics: (A) Classi?cation of quadratic forms; (B) Quadratic Diophantine equations. Topic (A) can be further divided into two types of theories: (a1) Classi?cation over an algebraic number ?eld; (a2) Classi?cation over the ring of algebraic integers. To classify a quadratic form ? over an algebraic number ?eld F, almost all previous authors followed the methods of Helmut Hasse. Namely, one ?rst takes ?[...]

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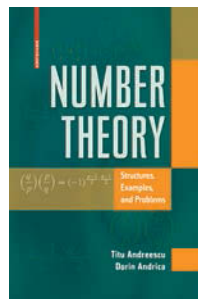
T. Andreescu, D. Andrica

Number Theory
Structures, Examples, and Problems

Number theory, an ongoing rich area of mathematical exploration, is noted for its theoretical depth, with connections and applications to other fields from representation theory, to physics, cryptography, and more. While the forefront of number theory is replete with sophisticated and famous open problems, at its foundation are basic, elementary ideas that can stimulate and challenge beginning students. This lively introductory text focuses on a problem-solving approach to the subject. Key features of Number Theory: Structures, Examples, and Problems: * A rigorous exposition starts with the natural numbers and the basics. * Important concepts are presented with an example, which may[...]
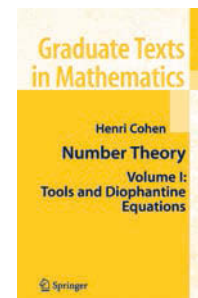
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H. Cohen

Number Theory
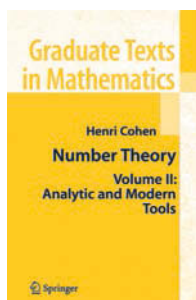### Volume I: Tools and Diophantine Equations

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H. Cohen

Number Theory
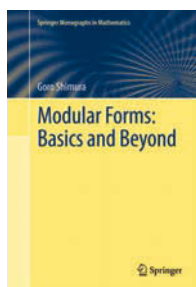### Volume II: Analytic and Modern Tools

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Numerical Analysis

G. Shimura

Modular Forms: Basics and Beyond

This is an advanced book on modular forms. While there are many books published about modular forms, they are written at an elementary level, and not so interesting from the viewpoint of a reader who already knows the basics. This book offers something new, which may satisfy the desire of such a reader. However, we state every definition and every essential fact concerning classical modular forms of one variable. One of the principal new features of this book is the theory of modular forms of half-integral weight, another being the discussion of theta functions and Eisenstein series of holomorphic and nonholomorphic types. Thus the book is presented so that the reader can learn such[...]

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Optimization
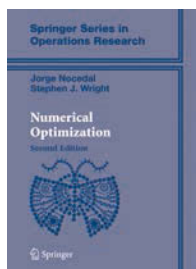
J. Nocedal, S. Wright

Numerical Optimization

Numerical Optimization presents a comprehensive and up-to-date description of the most effective methods in continuous optimization. It responds to the growing interest in optimization in engineering, science, and business by focusing on the methods that are best suited to practical problems. For this new edition the book has been thoroughly updated throughout. There are new chapters on nonlinear interior methods and derivative-free methods for optimization, both of which are used widely in practice and the focus of much current research. Because of the emphasis on practical methods, as well as the extensive illustrations and exercises, the book is accessible to a wide audience. It[...]

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Ordinary Differential Equations
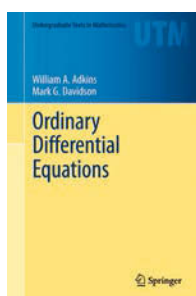
W. Adkins, M.G. Davidson

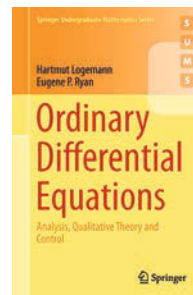## Ordinary Differential Equations

Unlike most texts in differential equations, this textbook gives an early presentation of the Laplace transform, which is then used to motivate and develop many of the remaining differential equation concepts for which it is particularly well suited. For example, the standard solution methods for constant coefficient linear differential equations are immediate and simplified, and solution methods for constant coefficient systems are streamlined. By introducing the

Laplace transform early in the text, students become proficient in its use while at the same time learning the standard topics in differential equations. The text also includes proofs of several important theorems that are[...]

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Hardcover

2012. XIII, 799 p. 121 illus. (Undergraduate Texts in Mathematics)
ISBN 978-1-4614-3617-1
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H. Logemann, E.P. Ryan

Ordinary Differential Equations
Analysis, Qualitative Theory and Control

The book comprises a rigorous and self-contained treatment of initial-value problems for ordinary differential equations. It additionally develops the basics of control theory, which is a unique feature in current textbook literature.The following topics are particularly emphasised:• existence, uniqueness and continuation of solutions,• continuous dependence on initial data,• flows,• qualitative behaviour of solutions,• limit sets,• stability theory,• invariance principles,• introductory control theory,• feedback and stabilization.The last two items cover classical control theoretic material such as linear control theory and absolute stability of nonlinear feedback systems. It also[...]
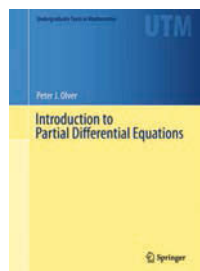
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Softcover

2014. XIII, 333 p. 40 illus. (Springer Undergraduate Mathematics Series)
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Partial Differential Equations

P. Olver

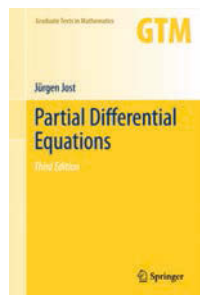## Introduction to Partial Differential Equations

This textbook is designed for a one year course covering the fundamentals of partial differential equations, geared towards advanced undergraduates and beginning graduate students in mathematics, science, engineering, and elsewhere. The exposition carefully balances solution techniques, mathematical rigor, and significant applications, all illustrated by numerous examples. Extensive exercise sets appear at the end of almost every subsection, and include straightforward computational problems to develop and reinforce new techniques and results, details on theoretical developments and proofs, challenging projects both computational and conceptual, and supplementary material that[...]

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2014. XXV, 635 p. 143 illus. (Undergraduate Texts in Mathematics)
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J. Jost

Partial Differential Equations

This book offers an ideal graduate-level introduction to the theory of partial differential equations. The first part of the book describes the basic mathematical problems and structures associated with elliptic, parabolic, and hyperbolic partial differential equations, and explores the connections between these fundamental types. Aspects of Brownian motion or pattern formation processes are also presented. The second part focuses on existence schemes and develops estimates for solutions of elliptic equations, such as Sobolev space theory, weak and strong solutions, Schauder estimates, and Moser iteration. In particu-

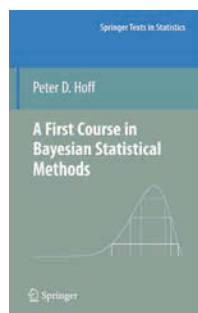lar, the reader will learn the basic techniques underlying current[...]

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ISBN 978-1-4614-4808-2
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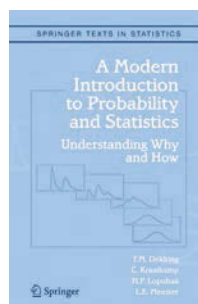# Probability Theory and Stochastic Processes

P.D. Hoff

A First Course in Bayesian Statistical Methods

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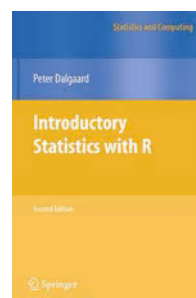
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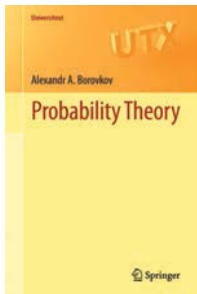
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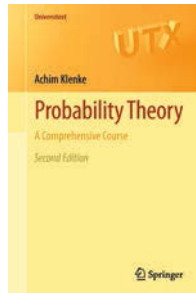
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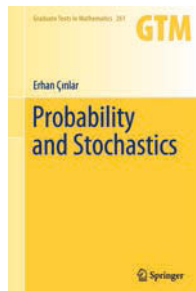
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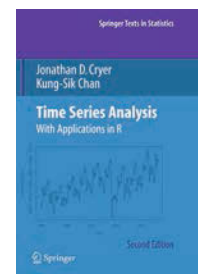
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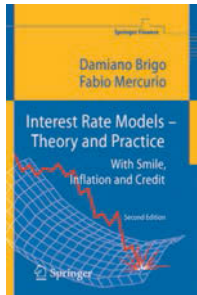More on www.springer.com/978-0-387-75958-6

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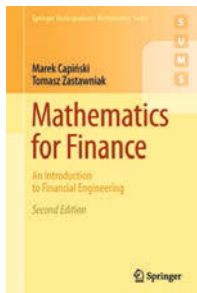
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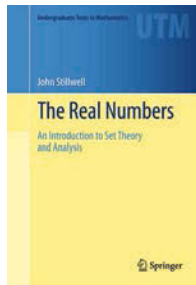More on www.springer.com/978-0-85729-081-6

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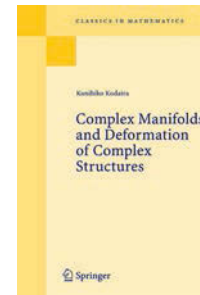
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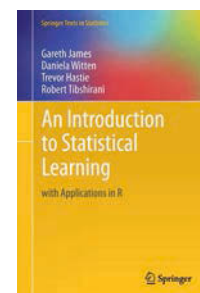
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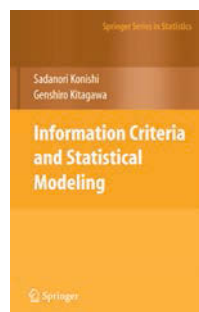
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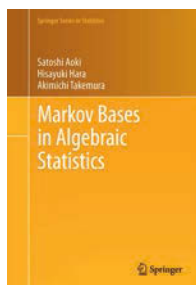
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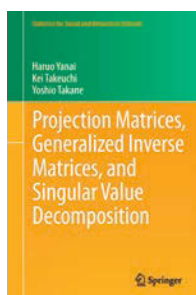
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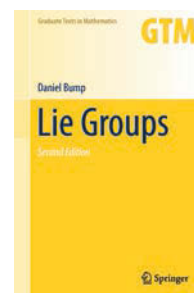
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