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ALGORITHMS AND ALGORITHM DESIGN



ISBN: 9789390394135

Analysis of Algorithms

🦨 Subhash K. Shinde | Monika Mangla | Nonita Sharma

____ 240 | © 2021

ABOUT THE BOOK

The purpose of this textbook is to introduce the reader to the basics of algorithms, analysis techniques, and designing of several algorithmic techniques in a simplistic and practical way. This book is especially designed to present the concepts in a naïve and easy fashion so that readers can grasp the concepts easily and can apply them for solving real-life problems. More emphasis has been laid on presenting the several mathematical concepts in a detailed and descriptive manner. The book has been specifically crafted for the subject - Design and Analysis of the Algorithms with an aim to assimilate the basics of algorithm analysis for an introductory graduate

course. It can also be used as a reference for self-study by researchers in the field of Computer Science or Computer Applications. Additionally, it can serve as an exemplar guide for the students in mathematics and allied branches to understand the principles of Analysis of Algorithms and Data structures. Hence, the book serves to establish a platform to understand the fundamentals of the subject persuading its readers to strive in-depth and multidimensional knowledge of the advanced topics related to the application of subject in real life scenario.

FEATURES

- Presentation of the concepts in the simplistic and descriptive manner.
- Numerical examples for enhanced understanding of the readers for each topic.
- Coverage of wide range of algorithmic techniques instead of focusing only on techniques.
- Inclusion of Exercise questions at the end of each chapter for self-practicing.
- Appendix at the end consisting of multiple-choice questions enabling the readers to assess their understandability.
- The book also contains programs in c language in appendix section that helps the readers to practically implement the concept

CONTENTS

- 1. Preface
- 2. Acknowledgements
- 3. About the Authors
- 4. Introduction to Algorithms
- 5. Analyzing Algorithms
- 6. Divide and Conquer
- 7. Greedy Method Approach
- 8. Dynamic Programming Approach

ABOUT THE AUTHOR(S)

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Nonita Sharma, Assistant Professor Dr B. R Ambedkar National Institute of Technology Jalandhar



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ALGORITHMS AND ALGORITHM DESIGN

 String Matching
 Approximation Algorithms Appendix
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9. Backtracking10. Branch and Bound

11. Maximum Flow

ALGEBRA



ISBN: 9789357059688

Linear Algebra and Its Applications, 5/e

🖌 David C. Lay | Steven R. Lay | Judi J. McDonald

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ABOUT THE BOOK

With traditional linear algebra texts, the course is relatively easy for students during the early stages as material is presented in a familiar, concrete setting. However, when abstract concepts are introduced, students often hit a wall. Instructors seem to agree that certain concepts (such as linear independence, spanning, subspace, vector space, and linear transformations) are not easily understood and require time to assimilate. These concepts are fundamental to the study of linear algebra, so students' understanding of them is vital to mastering the subject. This text makes these concepts more accessible by introducing them early in a familiar, concrete Rn

setting, developing them gradually, and returning to them throughout the text so that when they are discussed in the abstract, students are readily able to understand.

FEATURES

- More than 25% of the exercises are new or updated, especially computational exercises.
- Linear transformations form a "thread" that is woven into the fabric of the text. Their use enhances the geometric flavor of the text.
- A modern view of matrix multiplication is presented, with definitions and proofs focusing on the columns of a matrix rather than on the matrix entries.
- Focus on visualization: Each major concept in the course is given a geometric interpretation because many students learn better when they can visualize an idea.
- Numerical Notes provide a realistic slant to the text. Students are reminded frequently of issues that arise in reallife applications of linear algebra.
- Applications are varied and relevant. Each chapter opens with an introductory vignette that sets the state for some applications of linear algebra and provides a motivation for developing the mathematics that follows.
- Exercise sets are meticulously constructed and consist of the following elements. Each section features an abundant supply of exercises, ranging from routine computations to conceptual questions to applications. Innovative questions pinpoint conceptual difficulties that the authors have found in student papers over the years.

CONTENTS

- 1. Linear Equations in Linear Algebra
- 2. Matrix Algebra
- 3. Determinants
- 4. Vector Spaces

- 5. Eigenvalues and Eigenvectors
- 6. Orthogonality and Least Squares
- 7. Symmetric Matrices and Quadratic Forms
- 8. The Geometry of Vector Spaces

Appendix

ABOUT THE AUTHOR(S)

David C. Lay University of Maryl and Steven R. Lay Lee University Judi J. McDonald Washington State University





A First Course in Abstract Algebra, 8/e



ABOUT THE BOOK

A First Course in Abstract Algebra, 8th Edition retains its hallmark goal of covering all the topics needed for an in-depth introduction to abstract algebra — and is designed to be relevant to future graduate students, future high school teachers, and students who intend to work in industry. New co-author Neal Brand has revised this classic text carefully and thoughtfully, drawing on years of experience teaching the course with this text to produce a meaningful and worthwhile update. This in-depth introduction gives students a firm foundation for more specialized work in algebra by including extensive explanations of the what, the how, and the

why behind each method the authors choose.

FEATURES

- A focus on groups, rings and fields gives students a firm foundation for more specialized work by emphasizing an understanding of the nature of algebraic structures.
- Gives clear and concise explanations of the theory, with well-thought-out examples to highlight key points and clarify more difficult concepts.
- UPDATED Many exercises in the text have been updated, and many are new. Most exercise sets are

CONTENTS

I. Groups and Subgroups

- 9. Binary Operations
- 10. Groups
- **11.** Abelian Groups
- **12.** Nonabelian Examples
- **13.** Subgroups
- 14. Cyclic Groups
- **15.** Generating Sets and Cayley Digraphs

II. Structure of Groups

- 16. Groups and Permutations
- **17.** Finitely Generated Abelian Groups
- 18. Cosets and the Theorem of Lagrange
- 19. Plane Isometries

III. Homomorphisms and Factor Groups

- 20. Factor Groups
- 21. Factor-Group Computations and Simple Groups
- **22.** Groups Actions on a Set
- 23. Applications of G -Sets to Counting

IV. Advanced Group Theory

- 24. Isomorphism Theorems
- 25. Sylow Theorems
- 26. Series of Groups
- 27. Free Abelian Groups

broken down into parts consisting of computations, concepts, and theory.

- NEW Applied topics such as RSA encryption and coding theory as well as examples of applying Gröbner bases — have been added to the 8th Edition.
- Historical notes written by Victor Katz, an authority on the history of math, provide valuable perspective.
- 28. Free Groups
- **29.** Group Presentations

V. Rings and Fields

- **30.** Rings and Fields
- 31. Integral Domains
- 32. Fermat's and Euler's Theorems
- 33. Encryption

VI. Constructing Rings and Fields

- 34. The Field of Quotients of an Integral Domain
- 35. Rings and Polynomials
- 36. Factorization of Polynomials over Fields
- **37.** Algebraic Coding Theory
- 38. Homomorphisms and Factor Rings
- 39. Prime and Maximal Ideals
- 40. Noncommutative Examples

VII. Commutative Algebra

- 41. Vector Spaces
- 42. Unique Factorization Domains
- **43.** Euclidean Domains
- **44.** Number Theory
- 45. Algebraic Geometry
- 46. Gröbner Basis for Ideals

VIII. Extension Fields

- 47. Introduction to Extension Fields
- 48. Algebraic Extensions
- 49. Geometric Constructions
- 50. Finite Fields
- IX. Galois Theory

ABOUT THE AUTHOR(S)

John B Fraleigh, University of Rhode Island Neal Brand, University of North Texas

- 51. Introduction to Galois Theory
- 52. Splitting Fields
- 53. Separable Extensions
- 54. Galois Theory
- **55.** Illustrations of Galois Theory
- **56.** Cyclotomic Extensions
- 57. Insolvability of the Quintic



ISBN: 9789390168132



ABOUT THE BOOK

This acclaimed theorem-proof text presents a careful treatment of the principal topics of linear algebra. It emphasizes the symbiotic relationship between linear transformations and matrices, but states theorems in the more general infinite-dimensional case where appropriate. Applications to such areas as differential equations, economics, geometry, and physics appear throughout, and can be included at the instructor's discretion.

This book is especially suited to a second course in linear algebra that emphasizes abstract vector spaces, although it can be used in a first course with a strong

theoretical emphasis. Updates to the 5th Edition include revised proofs of some theorems, additional examples, and new exercises. Also new in this revision are online solutions for selected theoretical exercises, accessible by short URLs at point-of-use.

FEATURES

- Revised A streamlined presentation, with clarified exposition informed by extensive reviews from instructors.
- Revised Proofs of some theorems have been revised for further clarification.
- New Additional examples and exercises throughout.

CONTENTS

- 1. Vector Spaces
- 2. Linear Transformations and Matrices
- 3. Elementary Matrix Operations and Systems of Linear Equations
- 4. Determinants

- New Online solutions to selected theoretical exercises in each section of the book:
 - These exercises each have their exercise number printed within a gray box, and the last sentence of each of these exercises gives a short URL for its online solution.
- New Four new applications available online of the content in Sections 2.3, 5.3, 6.5, and 6.6. Short URLs at point-of-use provide easy access to this material.
- 5. Diagonalization
- 6. Inner Product Spaces
- 7. Canonical Forms

ABOUT THE AUTHOR(S)

Stephen H. Friedberg holds a BA in mathematics from Boston University and MS and PhD degrees in mathematics from Northwestern University, and was awarded a Moore Postdoctoral Instructorship at MIT. He served as a director for CUPM, the Mathematical Association of America's Committee on the Undergraduate Program in Mathematics. He was a faculty member at Illinois State University for 32 years, where he was recognized as the outstanding teacher in the College of Arts and Sciences in 1990. He has also taught at the University of London, the University of Missouri, and at Illinois Wesleyan University. He has authored or coauthored articles and books in analysis and linear algebra. Arnold J. Insel received BA and MA degrees in mathematics from the University of Florida and a PhD from the University of California at Berkeley. He served as a faculty member at Illinois State University for 31 years and at Illinois Wesleyan University for two years. In addition to authoring and co-authoring articles and books in linear algebra, he has written articles in lattice theory, topology, and topological groups.

Lawrence E. Spence holds a BA from Towson State College and MS and PhD degrees in mathematics from Michigan State University. He served as a faculty member at Illinois State University for 34 years, where he was recognized as the outstanding teacher in the College of Arts and Sciences in 1987. He is an author or co-author of nine college mathematics textbooks, as well as articles in mathematics journals in the areas of discrete mathematics and linear algebra.

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ABOUT THE BOOK

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ISBN: 9789353432997

FEATURES

- Examples in book are accompanied by similar practice problems that enable students to test their understanding of the material.
- Most sections include approximately twenty true/false exercises designed to test students understanding of the conceptual ideas in each section.

CONTENTS

- 1. Matrices, Vectors, and Systems of Linear Equations
- 2. Matrices and Linear Transformations
- 3. Determinants

ABOUT THE AUTHOR(S)

Stephen H. Friedberg, Illinois State University Arnold I. Insel, Illinois State University Lawrence E. Spence, Illinois State University

- For a proof-oriented course, the authors have included a significant number of accessible exercises requiring proofs, ordered according to difficulty.
- All computational exercises are designed so that the calculations involve "nice" numbers.
- The authors have added an appendix introducing MATLAB.
- 4. Subspaces and Their Properties

Elementary Linear Algebra, 2/e

Based on the recommendations of the Linear Algebra Curriculum Study Group, this introduction to linear algebra offers a matrix-oriented approach with more emphasis on problem solving and applications. Throughout the text, use of technology is encouraged. The focus is on matrix arithmetic, systems of linear equations, properties of Euclidean n-space, eigenvalues and eigenvectors, and orthogonality. Although matrix-oriented, the text provides a solid coverage of vector spaces.

Lawrence E. Spence | Arnold J. Insel | Stephen H Friedberg

- 5. Eigenvalues, Eigenvectors, and Diagonalization
- 6. Orthogonality
- 7. Vector Spaces

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Supplements





Linear Algebra with Applications, 5/e

Otto Bretscher

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Suppleme

ABOUT THE BOOK

Linear Algebra with Applications, Fifth Edition emphasizes linear transformations as a unifying theme. This elegant textbook combines a user-friendly presentation with straightforward, lucid language to clarify and organize the techniques and applications of linear algebra. Exercises and examples make up the heart of the text, with abstract exposition kept to a minimum. Exercise sets are broad and varied and reflect the author's creativity and passion for this course.

to the selection of exercises.

FEATURES

- Linear transformations are introduced early in the text to make the discussion of matrix operations more meaningful and easier to navigate.
- Visualization and geometrical interpretation are emphasized extensively throughout the text.
- Fifty to sixty True/False questions conclude every chapter, testing conceptual understanding and encouraging students to read the text.

CONTENTS

- **1.** Linear Equations
- **2.** Linear Transformations
- **3.** Subspaces of Rn and Their Dimensions

ABOUT THE AUTHOR

Otto Bretscher, Colby College, Waterville

F-Book available GEBRA Margaret L. Lial John Hornsby Terry McGinnis Pearson

ISBN: 9789353436896

Introductory Algebra, 11/e supplements Marge Lial | John Hornsby | Terry McGinnis 752 © 2019

ABOUT THE BOOK

This book has helped thousands of students succeed in the Introductory Algebra course by combining clear, concise writing and examples with carefully crafted exercises to support skill development and conceptual understanding. Written with the developmental learner in mind, the precise, accessible writing style delivers help precisely when needed. This revision faithfully continues to support students with enhancements in the text to encourage conceptual understanding beyond skills

ALGEBRA

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to visualize the relations between linear transformations.

■ Historical problems from ancient Chinese, Indian,

Rotations, reflections, projections, and shears are

used throughout to illustrate new ideas.

Commutative diagrams enable students

Arabic, and early European sources add diversity

- 7. Eigenvalues and Eigenvectors 8. Symmetric Matrices and Quadratic Forms
- **9.** Linear Differential Equations

4. Linear Spaces

- **5.** Orthogonality and Least Squares
- 6. Determinants

and procedures. Student-oriented features throughout the text, including the *Relating Concepts exercises*, *Guided Solutions, and the Test Your Word Power*, make this text one of the most well-rounded and student-friendly on the market.

FEATURES

- Learning Objectives begin each section, and all material is keyed to these objectives to let students and instructors know exactly what will be covered.
- An emphasis on problem solving is introduced and integrated as a six-step process for solving application problems algebraically: *Read, Assign a Variable, Write an Equation, Solve, State the Answer, and Check.*

CONTENTS

- 1. The Real Number System
- 2. Equations, Inequalities, and Applications
- **3.** Graphs of Linear Equations and Inequalities in Two Variables
- 4. Systems of Linear Equations and Inequalities

ABOUT THE AUTHOR(S)

- Margin Problems allow students to immediately practice the example material and check their answer at the bottom of the page in preparation for the exercise sets.
- Pointers within examples, Cautions and Notes provide students with important, on-the-spot reminders and warnings about common pitfalls.
- Real-Life Applications with interesting data are used in many new or updated examples and exercises throughout the text.
- 5. Exponents and Polynomials
- 6. Factoring and Applications
- 7. Rational Expressions and Applications
- 8. Roots and Radicals
- 9. Quadratic Equations

Algebra, 2/e

Algebra, Second Edition, by Michael Artin, is ideal for the honors undergraduate or introductory graduate course. The second edition of this classic text incorporates twenty years of feedback and the author's own teaching experience. The text discusses concrete topics of algebra in greater detail than most texts, preparing students for the more abstract concepts; linear algebra is tightly integrated

Marge Lial was a pioneering author and a visionary teacher who established features that are now standard in nearly all developmental math titles.

John Hornsby have experience of more than twenty-five years of teaching at the high school and university levels and fifteen years of writing mathematics textbooks.



ISBN: 9789332549838

FEATURES

- High emphasis on concrete topics, such as symmetry, linear groups, quadratic number fields, and lattices, prepares students to learn more abstract concepts. The focus on these special topics also allows some abstractions to be treated more concisely, devoting more space to the areas students are the most interested in.
- Thechapter organization emphasizes the connections between algebra and geometry at the start, with the beginning chapters containing the content most important for students in other fields. To counter the fact that arithmetic receives less initial emphasis, the later chapters have a strong arithmetic slant.
- Treatment beyond the basics sets this book apart from others. Students with a reasonably mature mathematical background will benefit from the relatively informal treatments the author gives to the more advanced topics.
- Content notes in the preface include teaching tips from the author's own classroom experience.

Michael Artin

© 2015

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ABOUT THE BOOK

throughout.



 Challenging exercises are indicated with an asterisk, allowing instructors to easily create the right assignments for their class.

CONTENTS

- 1. Matrices
- 2. Groups
- 3. Vector Spaces
- 4. Linear Operators
- 5. Applications of Linear Operators
- 6. Symmetry
- 7. More Group Theory
- 8. Bilinear Forms

ABOUT THE AUTHOR

- 9. Linear Groups
- 10. Group Representations
- 11. Rings
- 12. Factoring
- 13. Quadratic Number Fields

Differential Equations and Linear Algebra, 3/e

For combined differential equations and linear algebra courses teaching students who have successfully completed three semesters of calculus. This complete introduction to both differential equations and linear algebra presents a carefully balanced and sound integration of the two topics. It promotes in-depth understanding rather than rote memorization, enabling students to fully comprehend abstract

concepts and leave the course with a solid foundation in linear algebra. Flexible in format, it explains concepts clearly and logically with an abundance of examples

and illustrations, without sacrificing level or rigor. A vast array of problems supports the material, with varying levels from which students/instructors can choose.

- 14. Linear Algebra in a Ring
- 15. Fields
- 16. Galois Theory

Michael Artin (born 1934) is an American mathematician and a professor at MIT, known for his contributions to algebraic geometry. He is the son of Emil Artin. He was brought up in Indiana. In the early 1960s he spent time at the IHES in France, contributing to the SGA4 volumes of the Séminaire de géométrie algébrique, on topos theory and étale cohomology.He also worked on the question of characterising the representable functors in the category of schemes; this led to the Artin approximation theorem, in local algebra. This work also gave rise to the ideas of an algebraic space and algebraic stack, and has proved very influential in moduli theory. Additionally, he has made contributions to the deformation theory of algebraic varieties. In 2002, he won the American Mathematical Society's annual Steele Prize for Lifetime Achievement. He is currently working on non-commutative rings, especially geometric aspects.

Stephen W. Goode

800 C 2015

ABOUT THE BOOK



ISBN: 9789332571631

CONTENTS

- 1. First-Order Differential Equations
- 2. Matrices and Systems of Linear Equations
- 3. Determinants
- 4. Vector Spaces
- 5. Linear Transformation
- 6. Linear Differential Equations of Order n
- **7.** Systems of Differential Equations
- 8. The Laplace Transform and Some Elementary Applications

ABOUT THE AUTHOR(S)

Stephen W. Goode, California State University, Fullerton Scott A. Annin, California State University, Fullerton 9. Series Solutions to Linear Differential Equations

Appendices

- A. Review of Complex Numbers
- B. Review of Partial Fractions
- C. Review of Integration Techniques
- D. Linearly Independent Solutions to $x^2yn + xp(x)y^1 + q(x)y = 0$
- E. Answers to Odd-Numbered Exercises



Linear Algebra, 2/e

Kenneth M Hoffman | Ray Kunze

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ABOUT THE BOOK

This introduction to linear algebra features intuitive introductions and examples to motivate important ideas and to illustrate the use of results of theorems.

CONTENTS

- 1. Linear Equations
- 2. Vector Spaces
- 3. Linear
- Transformations
- 4. Polynomials
- 5. Determinants

- 6. Elementary canonical Forms
- 7. Rational and Jordan Forms
- 8. Inner Product Spaces
- 9. Operators on Inner Product Spaces
- 10. Bilinear Forms

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Linear Algebra and Differential Equations

🖌 Gary L. Peterson | James S. Sochacki

480 | © 2015

ABOUT THE BOOK

Linear Algebra and Differential Equations has been written for a one-semester combined linear algebra and differential equations course, yet it contains enough material for a two-term sequence in linear algebra and differential equations. By introducing matrices, determinants, and vector spaces early in the course, the authors are able to fully develop the connections between linear algebra and differential equations. The book is flexible enough to be easily adapted to fit most syllabi, including separate courses that that cover linear algebra in the first followed by differential equations in the second. Technology is fully integrated where appropriate,

and the text offers fresh and relevant applications to motivate student interest.

FEATURES

- Offers a solid foundation in both linear algebra and differential equations, with an emphasis on finding connections between the two subjects.
- Contains applications to many areas, including engineering, business, and life sciences.
- Maple exercises incorporated throughout; support is also offered to users of Mathematica and Matlab in the technology resource manual.

CONTENTS

- 1. Matrices and Determinants.
- 2. Vector Spaces.
- 3. First Order Ordinary Differential Equations.
- 4. Linear Differential Equations.
- 5. Linear Transformations and Eigenvalues and Eigenvectors.

Answers to Odd-Numbered Exercises.

ABOUT THE AUTHOR(S)

Gary L. Peterson, James Madison University James S. Sochacki, James Madison University

- 6. Systems of Differential Equations.
- 7. The Laplace Transform.
- **8.** Power Series Solutions to Linear Differential Equations.
- 9. Inner Product Spaces.

Index of Maple Commands.

CALCULUS



ISBN: 9789354498756

Vector Geometry and Elements of Calculus

🖌 Anindya Dey

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ABOUT THE BOOK

The present volume **Vector Geometry and Elements of Calculus** is primarily a textbook meant for the students beginning their academic journey with mathematics as their major subject in the CBCS curriculum. The book although consists of nine chapters on four different topics (viz. Vectors, Geometry, Calculus and Differential equations of first order) it is not just a compiled work—instead, the author claims to render some ingenuity in its representation as he has made honest attempts to twine these heterogeneous topics by making sensible yet limited use of vector and matrix algebra occasionally in the branches Geometry and Calculus and tried

to invoke physical insight to what is being taught to instill a spirit of global learning into the readers. Incisive remarks put at the ends of some worked-out examples and some of the theoretical discussions are exceptionally bright features not commonly found in the popular texts.

FEATURES

- Written based on the UGC proposed CBCS curriculum and more than 100% coverage of the topics prescribed in the core paper C- 1 [Calculus]
- Over 375 worked-out examples: 80% meant for mediocre students and 20% designed for advanced learners
- Over 350 MCQ's on the content of this book

CONTENTS

- 1. Vector Algebra and Its Applications
- 2. Calculus of Vector-valued Functions
- **3.** Two-Dimensional Geometry
- 4. Three-Dimensional Geometry
- 5. Elements of Differential Calculus
- 6. Application of Differential Calculus
- 7. Reduction Formulae
- Application of Integral Calculus
 Differential Equations of First Order and First Degree
- Multiple Choice Questions Answers to MCQ

- More than 180 figures to supplement the text
- End-of-chapter exercises of different variety for providing the learner's good practice
- Hints and Solutions to the exercises
- Bridging of different ideas of the four main areas through cross-references
- Compactness and lucidity of presentation

Appendix A: Tracing of Plane Curves Appendix B: L'Hôspital's Rule for Indeterminate Forms Appendix C: Alternative Proof of Vector Triple Product Formula Hints and Solutions to Exercises Bibliography Index

ABOUT THE AUTHOR

Anindya Dey is presently working as a Senior Assistant Professor in the Department of Mathematics, St. Xavier's College (Autonomous), Kolkata. He has been teaching at the undergraduate level for more than two decades primarily the topics like Differential Equations, Linear Algebra, Probability Theory, Vector Algebra & Vector Analysis, Mechanics and Special Theory of Relativity. He has so far authored two books, viz. Metric Spaces and Complex Analysis [New Academic Science, London, UK] and Differential Equations—A Linear algebra Approach [CRC Press]. Prof. Dey completed M.Sc. & M.Phil. in Applied Mathematics from the University of Kolkata and started his research career as CSIR Fellow in the Department of Applied Mathematics, C.U. but later on moved to Indian Statistical Institute, Kolkata. Quantum Mechanics and Supersymmetry are his areas of research interest. Presently he is working on Lie group theoretic ideas related to differential equations

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Advanced Calculus

ABOUT THE BOOK

This text presents a unified view of calculus in which theory and practice reinforce each other. It covers the theory and applications of derivatives (mostly partial), integrals, (mostly multiple or improper), and infinite series (mostly of functions rather than of numbers), at a deeper level than is found in the standard advanced calculus books.

FEATURES

■ Single and Multivariable Analysis equally balanced

- A focus on calculus itself and its applications
- Numerous worked-out examples and exercises throughout
- A chapter on Fourier analysis

CONTENTS

- **1.** Setting the Stage.
- **2.** Differential Calculus
- **3.** The Implicit Function Theorem and Its Applications
- 4. Integral Calculus
- 5. Line and Surface Integrals;
 - e integrais;
- Vector Analysis 6. Infinite Series

- 7. Fourier Series
- 8. Fourier Series

POD
E-Book

available

Joel Hass | Christopher Heil | Maurice D. Weir

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ABOUT THE BOOK
Thomas' Calculus, Fourteenth Edition, introduces students to the intrinsic beauty of calculus and the power of its applications. For more than half a century, this text

Thomas' Calculus, Fourteenth Edition, introduces students to the intrinsic beauty of calculus and the power of its applications. For more than half a century, this text has been revered for its clear and precise explanations, thoughtfully chosen examples, superior figures, and time-tested exercise sets.

FEATURES

ISBN: 9789353060411

P Pearson

- Strong exercise sets feature a great breadth of problems—progressing from skills problems to applied and theoretical problems—to encourage students to think about and practice the concepts until they achieve mastery.
- **Complete and precise multivariable coverage** enhances the connections of multivariable ideas with their single-variable analogues studied earlier in the book.

NEW TO THIS EDITION

- Updated graphics emphasize clear visualization and mathematical correctness.
- New examples and figures have been added throughout all chapters, based on user feedback.
- New types of homework exercises, including many geometric in nature, have been added to provide different perspectives and approaches to each topic.
- Short URLs have been added to the historical margin notes, allowing students to navigate directly to online information.
- New annotations within examples guide the student through the problem solution and emphasize that each step in a mathematical argument is rigorously justified.

CONTENTS

- 1. Functions
- 2. Limits and Continuity
- 3. Derivatives
- 4. Applications of Derivatives
- 5. Integrals
- 6. Applications of Definite Integrals
- 7. Transcendental Functions
- 8. Techniques of Integration
- 9. First-Order Differential Equations
- **10.** Infinite Sequences and Series

- **11.** Parametric Equations and Polar Coordinates
- 12. Vectors and the Geometry of Space
- 13. Vector-Valued Functions and Motion in Space
- 14. Partial Derivatives
- 15. Multiple Integrals
- **16.** Integrals and Vector Fields
- 17. Second-Order Differential Equations (Online)
- Appendices

Answers to Odd-Numbered Exercises

ABOUT THE AUTHOR(S)

George B. Thomas, Jr. (late) of the Massachusetts Institute of Technology, was a professor of mathematics for thirty-eight years; he served as the executive officer of the department for ten years and as graduate registration officer for five years. Thomas held a spot on the board of governors of the Mathematical Association of America and on the executive committee of the mathematics division of the American Society for Engineering Education.

Joel Hass received his PhD from the University of California Berkeley. He is currently a professor of mathematics at the University of California Davis. He has coauthored widely used calculus texts as well as calculus study guides. He is currently on the editorial board of several publications, including the Notices of the American Mathematical Society.

Christopher Heil received his PhD from the University of Maryland. He is currently a professor of mathematics at the Georgia Institute of Technology.

Maurice D. Weir (late) of the the Naval Postgraduate School in Monterey, California was Professor Emeritus as a member of the Department of Applied Mathematics. He held a DA and MS from Carnegie-Mellon University and received his BS at Whitman College.



ISBN: 9788177583250

Calculus & Analytical Geometry, 9/e

George B. Thomas Jr.

1264 | © 2006

ABOUT THE BOOK

George Thomas' clear, precise calculus text with superior applications defined the modern-day, three-semester or four-quarter calculus course. The ninth edition of this proven text has been carefully revised to give students the solid base of material they will need to succeed in math, science, and engineering programs. This edition includes recent innovations in teaching and learning that involve technology, projects, and group work.



06-Jan-24 4:17:10 PM

FEATURES

- Exercises have been reorganized to facilitate assigning a subset of the material in a section.
- New Computer Algebra System (CAS) explorations and projects that require a CAS have been included.
- Technology Connection notes appear throughout the text suggesting experiments students might do with a grapher to supplement their understanding of given topic.

CONTENTS

- 1. Preliminaries
- 2. Limits and Continuity
- 3. Derivatives
- 4. Applications of Derivatives
- 5. Integration
- **6.** Applications of Integrals
- 7. Transcendental Functions
- 8. Techniques of Integration
- 9. Infinite Series
- 10. Conic Sections, Parametrized Curves, and Polar Coordinates
- 11. Vectors and Analytic Geometry in Space
- 12. Vector-Valued Functions and Motion in Space
- **13.** Multivariable Functions and Partial Derivatives
- 14. Multiple Integrals
- 15. Integration in Vector Fields

DIFFERENTIAL EQUATIONS



ISBN: 9789353432270

Strong systems approach.

- Novel modeling approach.
- Flexible use of technology.

CONTENTS

Introduction to Differential Equations First-Order Equations Modeling and Applications Second-Order Equations The Laplace Transform Numerical Methods Differential Equations, 2/e

John Polking | Al Boggess | David Arnold

Suppreme

ABOUT THE BOOK

656 C 2019

Combining traditional differential equation material with a modern qualitative and systems approach, this new edition continues to deliver flexibility of use and extensive problem sets. The 2nd Edition's refreshed presentation includes extensive new visuals, as well as updated exercises throughout.

FEATURES

 Unique blend of traditional algebraic and modern qualitative geometric approaches.

> Matrix Algebra An Introduction to Systems Linear Systems with Constant Coefficients Nonlinear Systems Series Solutions to Differential Equations

16

DIFFERENTIAL EQUATIONS

DISCRETE MATHEMATICS AND GRAPH THEORY



Discrete Mathematics with Graph Theory, 3/e

🖌 Edgar Goodaire | Michael Parmenter

📋 592 | © 2019

ABOUT THE BOOK

Far more "user friendly" than the vast majority of similar books, this text is truly written in a friendly, conversational, humorous style with the "beginning" reader in mind. The pace is tight, the style is light, and the text emphasizes theorem proving throughout. The authors emphasize "Active Reading," a skill vital to success in learning how to think mathematically and write clean, error-free programs.

ISBN: 9789353433017

FEATURES

- A friendly, conversational, humorous style Makes this top seller stimulating and engaging for the reader.
- Emphasis on writing and critical-thinking skills.
- More than 300 worked examples and 3500 exercises. The problem sets are carefully graded by level of difficulty.
- A FREE Student Solutions Manual is built into the back of the text.
- Topics in discrete math are used as a vehicle for teaching proofs.
- An unusually strong emphasis on graph theory, incorporating its coverage throughout six chapters.

CONTENTS

- 1. Logic
- 2. Sets and Relations
- 3. Functions
- 4. The Integers
- 5. Induction and Recursion
- 6. Principles of Counting
- 7. Permutations and Combinations
- 8. Algorithms
- 9. Graphs
- **10.** Paths and Circuits
- 11. Applications of Paths and Circuits
- 12. Trees
- 13. Planar Graphs and Colorings
- 14. The Max Flow -- Min Cut Theorem

ABOUT THE AUTHOR

Edgar Goodaire Honorary Research Professor (retired). PhD British Columbia, 1973 B.Sc. Toronto, 1969. CMS Distinguished Service Award, 2004.

17

DISCRETE MATHEMATICS AND GRAPH THEORY



Discrete and Combinatorial Mathematics, 5/e

Ralph P. Grimaldi

🗍 1008 | 🔘 2019

ABOUT THE BOOK

This fifth edition continues to improve on the features that have made it the market leader. The text offers a flexible organization, enabling instructors to adapt the book to their particular courses. The book is both complete and careful, and it continues to maintain its emphasis on algorithms and applications. Excellent exercise sets allow students to perfect skills as they practice. This new edition continues to feature numerous computer science applications—making this the ideal text for preparing students for advanced study.

FEATURES

- Enhanced mathematical approach with carefully thought out examples, including many examples with computer sciences applications.
- New material on cryptology, private-key cryptosystems and public-key RSA cryptosystems.
- Expanded treatment of discrete probability.
- Includes historical reviews and biographies that bring a human element to their assignments.
- Provides chapter summaries to allow students to review what they have learned.

CONTENTS

PART 1. FUNDAMENTALS OF DISCRETE MATHEMATICS.

- 1. Fundamental Principles of Counting.
- 2. Fundamentals of Logic.
- 3. Set Theory
- 4. Properties of the Integers: Mathematical Induction
- 5. Relations and Functions.
- 6. Languages: Finite State Machines.
- 7. Relations: The Second Time Around.

PART 2. FURTHER TOPICS IN ENUMERATION.

- 8. The Principle of Inclusion and Exclusion.
- 9. Generating Functions.
- **10.** Recurrence Relations.

PART 3. GRAPH THEORY AND APPLICATIONS.

- **11.** An Introduction to Graph Theory.
- 12. Trees.
- **13.** Optimization and Matching

PART 4. MODERN APPLIED ALGEBRA.

- **14.** Rings and Modular Arithmetic
- **15.** Boolean Algebra and Switching Functions.
- **16.** Groups, Coding Theory, and Polya's Theory of Enumeration.
- 17. Finite Fields and Combinatorial Designs.

ABOUT THE AUTHOR

Ralph Peter Grimaldi (born January 1943) is an American mathematician specializing in discrete mathematics who is a professor at Rose-Hulman Institute of Technology.

DISCRETE MATHEMATICS AND GRAPH THEORY

Supplements



FEATURES

- Covers a wide range of topics:
 - Dilworth's Theorem
 - Partitions of integers
 - Counting sequences and generating functions
 - Extensive graph theory coverage
- A clear and accessible presentation, written from the student's perspective, facilitates understanding of basic concepts and principles.
- An excellent treatment of Pólya's Counting Theorem that does not assume students have studied group theory.
- Many worked examples illustrate methods used.

CONTENTS

- 1. What is Combinatorics?
- 2. The Pigeonhole Principle
- 3. Permutations and Combinations
- 4. Generating Permutations and Combinations
- 5. The Binomial Coefficients
- 6. The Inclusion-Exclusion Principle and Applications
- 7. Recurrence Relations and Generating Functions
- 8. Special Counting Sequences
- 9. Systems of Distinct Representatives
- **10.** Combinatorial Designs
- 11. Introduction to Graph Theory
- **12.** More on Graph Theory
- 13. Digraphs and Networks
- 14. Pólya Counting

ABOUT THE AUTHOR

Richard A. Brualdi is Bascom Professor of Mathematics, Emeritus at the University of Wisconsin-Madison. He served as Chair of the Department of Mathematics from 1993–1999.

DISCRETE MATHEMATICS AND GRAPH THEORY

Richard A. Brualdi

624 © 2019

ABOUT THE BOOK

This trusted best-seller covers the key combinatorial ideas-including the pigeonhole principle, counting techniques, permutations and combinations, Pólya counting, binomial coefficients, inclusion-exclusion principle, generating functions and recurrence relations, combinatorial structures (matchings, designs, graphs), and flows in networks. The 5th Edition incorporates feedback from users to the exposition throughout and adds a wealth of new exercises.

Introductory Combinatorics, 5/e



Catalogue_MATH_2024.indd 19



Mathematics



ISBN: 9788131733103

FEATURES

- C Programs of important algorithms
- Extensive coverage of Boolean Algebra, Algebraic Structures and Graph Theory
- 550 Solved examples and 170 practice problems with hints/answers

CONTENTS

2. Counting

- 1. Sets, Relations and Functions
- **5.** Algebraic Structures
- 6. Lattices 7. Boolean Algebra
- 3. Recurrence Relations
- 4. Logic

ABOUT THE AUTHOR(S)

Babu Ram received his Ph.D. degree in mathematics in 1973 from Kurukshetra University, Kurukshetra, India. He was formerly Professor of Mathematics and Dean, Faculty of Physical Sciences at Maharshi Dayanand University, Rohtak and has been teaching mathematics for the past 36 years. A member of Indian Mathematical Society and the American Mathematical Society, Professor Babu Ram has published 42 research papers in Real and Functional Analysis in international journals of repute. He is on the board of reviewers of both American Mathematical Reviews and Zentralblatt fur Mathematik und ihre Grengebiete, Berlin. Presently, he is working as Director MCA at Manav Rachna International University, Faridabad.

DISCRETE MATHEMATICS AND GRAPH THEORY



Discrete Mathematics

🖌 Babu Ram	Supplem
584 © 2011	stu ¹

ABOUT THE BOOK

Discrete Mathematics is an integral part of any undergraduate as well as post graduate courses in Computer Science and Mathematics. The syllabi of all these courses have been studied in depth and utmost care has been taken to ensure that all the essential topics in discrete structures are adequately emphasized. The book will enable the students to develop the requisite computational skills needed in software engineering.

- 8. Graphs
- 9. Finite State Automata
- **10.** Languages and Grammars



Discrete Mathematical Structures, 6/e

Bernard Kolman | Robert Busby | Sharon C. Ross

552 | © 2015

ABOUT THE BOOK

Discrete Mathematical Structures, Sixth Edition, offers a clear and concise presentation of the fundamental concepts of discrete mathematics. Ideal for a one-semester introductory course, this text contains more genuine computer science applications than any other text in the field.

This book is written at an appropriate level for a wide variety of majors and non-majors, and assumes a college algebra course as a prerequisite.

FEATURES

- The focus on computer science prepares students for future computer science careers.
- The emphasis on proof lays the foundation for mathematical thinking.
- Clear organization of topics prevents students from being overwhelmed. The authors treat relations and digraphs as two aspects of the same fundamental idea, which is then used as the basis of virtually all the concepts introduced in the book.
- Vignettes of mathematical history open each chapter, providing students with a practical background of how these ideas were developed.
- Additional number theory coverage provides more information on the properties of integers, including base n representations, and gives more contexts for isomorphism.
- Cryptology is explored throughout the book, introducing students to this exciting field.
- Coverage of coding provides students with a full picture of all of its aspects, including efficiency, effectiveness, and security. A set of coding exercises for each chapter is also included in Appendix C.
- Exercises emphasize multiple representations of concepts, and provide practice on reading and writing mathematical proofs.
- Experiments provide opportunities for in-depth exploration and discovery, as well as for writing and for working in groups. Topics include weighted voting systems, Petri nets, Catalan numbers, and others.
- End-of-chapter material includes Tips for Proofs, a summary of Key Ideas, and a Self-Test, which contains a set of conceptual review questions to help students identify and synthesize the main ideas of each chapter.

CONTENTS

- 1. Fundamentals
- 2. Logic
- 3. Counting
- 4. Relations and Digraphs
- 5. Functions
- 6. Order Relations and Structures
- 7. Trees
- 8. Topics in Graph Theory
- 9. Semigroups and Groups
- **10.** Groups and Coding
- 11. Languages and Finite-State
 - Machines

ABOUT THE AUTHOR(S)

Bernard Kolman received his BS in mathematics and physics from Brooklyn College in 1954, his ScM from Brown University in 1956, and his PhD from the University of Pennsylvania in 1965, all in mathematics. He has worked as a mathematician for the US Navy and IBM. He has been a member of the mathematics department at Drexel University since 1964, and has served as Acting Head of the department. His research activities have included Lie algebra and perations research. He belongs to a number of professional associations and is a member of Phi Beta Kappa, Pi Mu Epsilon, and Sigma Xi.

Robert C. Busby received his BS in physics from Drexel University in 1963, his AM in 1964 and PhD in 1966, both in mathematics from the University of Pennsylvania. He has served as a faculty member of the mathematics department at Drexel since 1969. He has consulted in applied mathematics and industry and government, including three years as a consultant to the Office of Emergency Preparedness, Executive Office of the President, specializing in applications of mathematics to economic problems. He has written a number of books and research papers on operator algebra, group representations, operator continued fractions, and the applications of probability and statistics to mathematical demography.

DISCRETE MATHEMATICS AND GRAPH THEORY

Sharon Cutler Ross received a SB in mathematics from the Massachusetts Institute of Technology in 1965, an MAT in secondary mathematics from Harvard University in 1966, and a PhD in mathematics from Emory University in 1976. She has taught junior high, high school, and college mathematics, and has taught computer science at the collegiate level. She has been a member of the mathematics department at DeKalb College. Her current professional interests are in undergraduate mathematics education and alternative forms of assessment. Her interests and associations include the Mathematical Association of America, the American Mathematical Association of Two-Year Colleges, and UME Trends. She is a member of Sigma Xi and other organizations.



ISBN: 9789332550490

dealt with.

Discrete Mathematics for Computer Scientists, 2/e

Joe L Mott | Abraham Kandel

768 | © 2015

ABOUT THE BOOK

This is a lucidly written fine-tuned introduction to discrete mathematics. It is eminently suited for students persuing BCA, MCA and B.E./B.Tech courses. Considering the importance of the subject, quite a number of universities have sought to introduce discrete mathematics as a core subject in the engineering curriculum.

FEATURES

• Comprehensive discussions on graph theory, mathematical induction, Boolean algebras, logic and other proof techniques and recurrence relations have been

- Gives good insights into graphs as a modeling tool.
- Gives better understanding of computer solutions of differential equations.
- Many worked out examples and solutions follow each section.

CONTENTS

- Acknowledgments
- A Note to the Reader
- Foundations
- Elementary Combinatorics
- Recurrence Relations
- Relations and Digraphs
- Graphs
- Boolean Algebras

- Network Flows
- Representation and Manipulation of Imprecision
- Bibliography



ISBN: 9788131790618

Discrete Mathematics, 5/e

Kenneth A Ross | Charles R. Wright

635 | **©** 2012

ABOUT THE BOOK

Revised for extra clarity, the distinguishing characteristic of Ross and Wright is a sound mathematical treatment that increases smoothly in sophistication. The text presents utility-grade discrete math tools so students can understand them, use them, and move on to more advanced mathematical topics

DISCRETE MATHEMATICS AND GRAPH THEORY

FEATURES

- NEW Over 270 supplementary exercises All with answers
- NEW Full chapter on discrete probability
- NEW Chapter on algebraic structures
- Comprehensive coverage of logic and proofs
- Full chapter on recursion

CONTENTS

- 1. Sets, Sequences, and Functions
- 2. Elementary Logic
- 3. Relations
- 4. Induction and Recursion
- 5. Counting
- 6. Introduction to Graphs and Trees
- 7. Recursion, Trees and Algorithms

ABOUT THE AUTHOR(S)

Kenneth A. Ross, University of Oregon Charles R. Wright, University of Oregon

- 8. Digraphs
- 9. Discrete Probability
- 10. Boolean Algebra
- 11. More on Relations
- **12.** Algebraic Structures
- 13. Predicate Calculus and Infinite Sets



ISBN: 9789332549654

FEATURES

Introduction to Graph Theory, 2/e



470 | © 2015

ABOUT THE BOOK

For undergraduate or graduate courses in Graph Theory in departments of mathematics or computer science.

This text offers a comprehensive and coherent introduction to the fundamental topics of graph theory. It includes basic algorithms and emphasizes the understanding and writing of proofs about graphs. Thought-provoking examples and exercises develop a thorough understanding of the structure of graphs and the techniques used to analyze problems. The first seven chapters form the basic course, with advanced material in Chapter 8.

- NEW Appendix of Mathematical Background—Appendix A presents background material on logical statements, basic set theory, equivalence relations, and elementary counting.
- Makes review material easily accessible for beginning students (Chapter 1 still discusses central proof techniques).
- NEW Expanded and improved selection of exercises—Exercises have been added, especially easier exercises, and many exercises have been further clarified.
- Enlarged selection of easier exercises provides greater encouragement for beginning students and makes the material useful for a broader range of students.
- NEW Reorganization of material. Some material has been reorganized to provide a smoother development and clearer focus on essential material with optional material clearly designated or removed.
- Facilitates more efficient learning by aiding instructors in designing courses and students in seeing what is important.
- NEW Definitions more prominent. Terms being defined are in bold type and most important definitions occur in numbered items.
- Makes definitions easier for students to find.
- NEW Hints for selected exercises—More hints have been added as Appendix C.
- Allows students to learn at their own pace; weaker students have more opportunity to be successful; stronger students have more opportunity to be stimulated.

DISCRETE MATHEMATICS AND GRAPH THEORY

Suppleme

- Logical organization—Concepts are introduced as needed, achieving a gradual increase in intellectual difficulty.
- Allows students to find fundamental results in the early sections of chapters and to master elementary concepts in preparation for later applications.
- Additional topics—Final chapter is a bridge to advanced topics.
- Provides supplementary reading for good students and flexibility in advanced courses.
- Over 400 illustrations.
- Allows students to check their understanding of definitions and of steps in proofs.
- Over 1200 exercises—Ranging from relatively straightforward applications of ideas in the text to subtle problems requiring some ingenuity.
- Helps students to understand the ideas of the course and to improve their presentation of coherent arguments.
- Graduation of exercises—Denotes easier exercises by (-), harder by (+), and particularly valuable or instinctive exercises by (!).
- Aids instructor in selecting appropriate exercises and students in practicing for tests.

CONTENTS

- 1. Fundamental Concepts. What Is a Graph? Paths, Cycles, and Trails. Vertex Degrees and Counting. Directed Graphs.
- 2. Trees and Distance. Basic Properties. Spanning Trees and Enumeration. Optimization and Trees.
- 3. Matchings and Factors. Matchings and Covers. Algorithms and Applications. Matchings in General Graphs.
- Connectivity and Paths. Cuts and Connectivity. k-connected Graphs. Network Flow Problems.
- Coloring of Graphs. Vertex Colorings and Upper Bounds. Structure of k-chromatic Graphs. Enumerative Aspects.
- 6. Planar Graphs.

Embeddings and Euler's Formula. Characterization of Planar Graphs. Parameters of Planarity.

- Edges and Cycles. Line Graphs and Edge-Coloring. Hamiltonian Cycles. Planarity, Coloring, and Cycles.
- 8. Additional Topics (Optional). Perfect Graphs. Matroids. Ramsey Theory. More Extremal Problems. Random Graphs. Eigenvalues of Graphs.

DISCRETE MATHEMATICS AND GRAPH THEORY

Appendix A: Mathematical Background. Appendix B: Optimization and Complexity. Appendix C: Hints for Selected Exercises. Appendix D: Glossary of Terms. Appendix E: Supplemental Reading. Appendix F: References.

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FEATURES

- Over 250 unsolved questions
- Around 400 solved examples

CONTENTS

- 1. Set Theory
- 2. Relations and Digraphs
- 3. Functions
- 4. Mathematical Logic and Methods of Proofs
- 5. Combinatorics
- 6. Recurrence Relations and Generating Functions

Discrete Mathematical Structures

🖌 U.S Gupta

576 © 2014

ABOUT THE BOOK

Discrete Mathematical Structures provides comprehensive, reasonably rigorous and simple explanation of the concepts with the help of numerous applications from computer science and engineering.

Every chapter is equipped with a good number of solved examples that elucidates the definitions and theorems discussed. Chapter-end exercises are graded, with the easier ones in the beginning and then the complex ones, to help students for easy solving.

- 7. Algebraic Structures
- 8. Ordered Sets and Lattices
- 9. Boolean Algebra
- 10. Graph Theory
- 11. Trees
- 12. Vector Spaces

ABOUT THE AUTHOR

Uma Shanker Gupta joined the department of mathematics, the University of Roorkee (presently IIT-Roorkee), in 1967, after teaching for five years at Ewing Christian Degree College, Allahabad. He was awarded PhD (Mathematics) by the University of Roorkee in 1971. He has been a reviewer of many International journals like Journal of Applied Mechanics, Journal of Sound and Vibration to name a few. He became EMERITUS FELLOW in 2004 and held this position till 2006.

DISCRETE MATHEMATICS AND GRAPH THEORY

HISTORY OF MATH



ISBN: 9789353433000

A History of Mathematics, 3/e



ABOUT THE BOOK

A History of Mathematics, 3rd Edition, provides students with a solid background in the history of mathematics and focuses on the most important topics for today's elementary, high school, and college curricula. Students will gain a deeper understanding of mathematical concepts in their historical context, and future teachers will find this book a valuable resource in developing lesson plans based on the history of each topic.

FEATURES

- The flexible presentation organizes the book by chronological period and then by topic.
- Discussions of the important textbooks of major time periods show students how topics were historically treated, allowing students to draw connections to modern approaches.
- A global perspective integrates non-Western coverage, including contributions from Chinese, Indian, and Islamic mathematicians. An additional chapter discusses the mathematical achievements of early Africa, America, and Asia.
- Chapter openers include a vignette and quotation to add motivation and human interest.
- **Focus essays** are boxed features that are set apart from the main narrative of the text for easy reference.
- A chronology of major mathematicians at the end of every chapter gives an overview of important individuals and their contribution to the field of mathematics.

CONTENTS

- 1. Egypt and Mesopotamia
- 2. The Beginnings of Mathematics in Greece
- 3. Euclid
- 4. Archimedes and Apollonius
- 5. Mathematical Methods in Hellenistic Times
- 6. The Final Chapter of Greek Mathematics

Part II. Medieval Mathematics

- 7. Ancient and Medieval China
- 8. Ancient and Medieval India
- **9.** The Mathematics of Islam
- 10. Medieval Europe
- 11. Mathematics Elsewhere

Part III. Early Modern Mathematics

- 12. Algebra in the Renaissance
- 13. Mathematical Methods in the Renaissance
- **14.** Geometry, Algebra and Probability in the Seventeenth Century

- 15. The Beginnings of Calculus
- **16.** Newton and Leibniz

Part IV. Modern Mathematics

- **17.** Analysis in the Eighteenth Century
- **18.** Probability and Statistics in the Eighteenth Century
- **19.** Algebra and Number Theory in the Eighteenth Century
- **20.** Geometry in the Eighteenth Century
- 21. Algebra and Number Theory in the Nineteenth Century
- 22. Analysis in the Nineteenth Century
- **23.** Probability and Statistics in the Nineteenth Century
- 24. Geometry in the Nineteenth Century
- **25.** Aspects of the Twentieth Century

ABOUT THE AUTHOR

Victor J. Katz received his PhD in mathematics from Brandeis University in 1968 and has been Professor of Mathematics at the University of the District of Columbia for many years.

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HISTORY OF MATH

GEOMETRY



ISBN: 9788131773604

CONTENTS

PART I

- 1. Coordinate Geometry
- 2. Straight Line
- 3. Pair of straight lines
- 4. Circle
- 5. System of circles
- 6. Parabola
- 7. Ellipse
- 8. Hyperbola

ABOUT THE AUTHOR

Analytical Geometry: 2D and 3D

🖌 P R Vittal

📋 752 | © 2013

ABOUT THE BOOK

Designed to meet the requirements of UG students, the book deals with the theoretical as well as the practical aspects of the subject. Equal emphasis has been given to both 2D as well as 3D geometry. The book follows a systematic approach with adequate examples for better understanding of the concepts.

- 9. Polar co-ordinates
- 10. Tracing of Curves
- PART II
 - 11. Three dimension
 - 12. Plane
 - 13. Straight line
 - 14. Sphere
 - 15. Cone
 - 16. Cylinder

P. R. Vittal was a postgraduate professor of mathematics at Ramakrishna Mission Vivekananda College, Chennai, from where he retired as principal in 1996. His assignments as visiting professor took him to Western Carolina University, USA. Currently, Vittal is a visiting professor at the Department of Statistics, University of Madras; The Institute of Chartered Accountants of India, Chennai; the Institute for Technology and Management, Chennai; and National Management School, Chennai, besides being a research guide for management science at BITS Pilani.

GEOMETRY

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MATHEMATICAL/NUMERICAL METHODS



Numerical Methods Babu Ram Supplement 520 | © 2010 2010

ABOUT THE BOOK

Numerical Methods is a mathematical tool used by engineers and mathematicians to do scientific calculations. It is used to find solutions to applied problems where ordinary analytical methods fail. This book is intended to serve for the needs of courses in *Numerical Methods* at the Bachelors' and Masters' levels at various universities.

ISBN: 9788131732212

FEATURES

Concise and easy-

to-understand treatment of concepts

 Most of the numerical methods have been described technically along with the convergence and error propagation

CONTENTS

- 1. Preliminaries
- 2. Non-Linear Equations
- 3. Linear Systems of Equations
- 4. Eigenvalues and Eigenvectors
- 5. Finite Differences and Interpolation
- 6. Curve Fitting

- 260 solved examples
- 160 practice problems
- Error analysis using various methods
- C programs of important numerical methods
- 7. Numerical Differentiation
- 8. Numerical Quadrature
- 9. Difference Equations
- 10. Ordinary Differential Equations
- **11.** Partial Differential Equations
- 12. Elements of C Language

ABOUT THE AUTHOR

Babu Ram received his Ph.D. degree in Mathematics in 1973 from Kurukshetra University, Kurukshetra, India. He retired from Maharshi Dayanand University, Rohtak in 2006 as Professor of Mathematics and Dean, Faculty of Physical Sciences. Currently, he is Programme Director (MCA) at Manav Rachna International University, Faridabad (Haryana). He has published 42 research papers in Real and Functional Analysis in international journals of repute.



Algebraic and Transcendental Equations, Solution of Linear System of Equation, Curve Fitting, Initial value problem for ordinary differential equation, Boundary value problems of second order partial differential equation and Solution of difference equation with constant coefficient.

FEATURES

 An exclusive coverage on Boundary value problems of second order partial differential equation and solution of difference equation with constant coefficient

CONTENTS

- 1. Errors in Numerical Computations
- 2. Solution of Algebraic and Transcendental Equations
- 3. Polynomial Interpolation
- 4. Inverse Interpolation
- 5. Numerical Differentiation
- 6. Numerical Integration

- Over 200 line diagrams
- 400 solved problems
- 250 unsolved problems for practice.
- 7. Curve Fitting
- 8. Initial value Problems for Ordinary Differential Equations
- **9.** Boundary Value problems in Ordinary and Partial Differential Equation
- 10. Differential Equations

ABOUT THE AUTHOR(S)

P. Sivaramakrishna Das started his career as Assistant Professor of Mathematics at Ramakrishna Mission Vivekananda College, Chennai, his alma mater, and retired as Professor and Head of the Department of Mathematics from the same college after an illustrious career spanning 36 years. Currently, he is Professor of Mathematics, Department of Science and Humanities, K.C.G. College of Technology, Chennai.

C. Vijayakumari began her career as Assistant Professor of Mathematics at Government Arts College for Women, Thanjavur, and has taught at various government arts and science colleges across Tamil Nadu before retiring as Professor of Mathematics, Queen Mary's College, Chennai, with 40 years of teaching experience behind her.



FEATURES

- Full-page overview for each chapter "Includes two applications to introduce each chapter (except the first introductory chapter)
- End-of-chapter Beyond the Basics or Further Topics Introduce more advanced methods, often including those used by MATLAB and other professionally developed software packages.
- Chapter Wrap-Up "Includes a summary of the formulas for the basic methods presented in the chapter, suggestions for further reading, and several types of exercises.
- Practice the Techniques problems "Present fairly straightforward problems that encourage practice by handor verification of simple MATLAB programs.

MATHEMATICAL/NUMERICAL METHODS



CONTENTS

- 1. Foundations
- 2. Functions of One Variable
- 3. Solving Linear Systems: Direct Methods
- 4. LU and QR Factorization
- 5. Eigenvalues and Eigenvectors
- 6. Solving Linear Systems: Iterative Methods
- 7. Nonlinear Functions of Several Variables
- 8. Interpolation

- 9. Approximation
- 10. Fourier Methods
- **11.** Numerical Differentiation and Integration
- 12. Ordinary Differential Equations: Fundamentals
- 13. ODE: Systems, Stiffness, Stability
- 14. ODE: Boundary-Value Problems
- 15. Partial Differential Equations



ISBN: 9788131717400

Applied Numerical Analysis, 7/e

Curtis F. Gerald

624 © **2007**

ABOUT THE BOOK

The seventh edition of this classic text has retained the features that make it popular, while updating its treatment and inclusion of Computer Algebra Systems and Programming Languages. The exercise sets include additional challenging problems and projects which show practical applications of the material. Also, sections which discuss the use of computer algebra systems such as Maple[®], Mathematica[®], and MATLAB[®], facilitate the integration of technology in the course. Furthermore, the text incorporates programming material in both FORTRAN and C. The breadth of topics, such as partial differential equations, systems of nonlinear equations, and

matrix algebra, provide comprehensive and flexible, coverage of all aspects of numerical analysis.

FEATURES

- Applied problems and applications emphasize real applications not detailed mathematical theorems
- Computer programs in either Fortran 90 or C are given at the conclusion of each chapter.
- Treats Linear systems before non-linear systems.
- The pace of topic presentation is appropriate for the audience.
- Excellent treatment of parallel processing.

CONTENTS

- 1. Solving Nonlinear Equations.
- 2. Solving Sets of Equations.
- 3. Interpolation and Curve Fitting.
- 4. Approximation of Functions.
- 5. Numerical Differentiation and Integration.
- 6. Numerical Solution of Ordinary Differential Equations.
- 7. Optimization.
- 8. Partial Differential Equations.
- 9. Finite Element Analysis.



Numerical Methods Using MATLAB, 4/e

🖌 John H. Mathews | Kurtis K. Fink

696 0 2015

ABOUT THE BOOK

This book provides a fundamental introduction to numerical analysis for undergraduate students in the areas of mathematics, computer science, physical sciences, and engineering. Knowledge of calculus is assumed.

FEATURES

- NEW Expanded emphasis on analysis of competing methods and issues of error.
- NEW Rewritten chapter on numerical optimization.
- NEW New topics for minimization of z = f(x,y) are included.
- NEW Projects for undergraduate library research experience have been added.
- Explicit use of the software MATLAB is offered.
- Each numerical method is presented in a self-contained format.
- Balance of theory and application.
- A variety of problems to sharpen students skills with extensive problem sets with a wide variety of activities.
- A wealth of tables and graphs which illustrates computer calculations in examples making the resulting numerical approximations easier to interpret.

CONTENTS

- 1. Preliminaries.
- **2.** The Solution of Nonlinear Equations f(x) = 0.
- **3.** The Solution of Linear Systems AX = B.
- 4. Interpolation and Polynomial Approximation.
- 5. Curve Fitting.
- 6. Numerical Differentiation.
- 7. Numerical Integration.

ABOUT THE AUTHOR(S)

John H. Mathews, California State University, Fullerton Kurtis K. Fink, Northwest Missouri State University

- 8. Numerical Optimization.
- 9. Solution of Differential Equations.
- **10.** Solution of Partial Differential Equations.
- 11. Eigenvalues and Eigenvectors.

Appendix: An Introduction to MATLAB. Answers to Selected Exercises.

MATHEMATICAL/NUMERICAL METHODS



Basic Applied Mathematics for the Physical Sciences Based on the Syllabus of the University of Dahi



ISBN: 9788131787823

Basic Applied Mathematics for the Physical Sciences Based on the syllabus of the University of Delhi, Updated 3/e

R. D. Sarma | Umesh Kumar

440 | © 2012

ABOUT THE BOOK

Basic Applied Mathematics for the Physical Sciences offers an introductory course in mathematics for the undergraduate students of physical sciences and applied physical sciences in the University of Delhi. Well structured into three parts, this book presents an in-depth study of matrices, calculus and complex numbers. It provides a perfect blend of theoretical principles and numerical problems to help students enhance their understanding of mathematical concepts and their applications. A student-friendly approach and an easy-paced treatment of all relevant topics make this book useful for students of mathematics.

FEATURES

- Completely covers the semester-wise revised syllabus of the University of Delhi
- Includes the University of Delhi's solved question papers for the years 2010-11 and 2011-12
- Mathematical concepts explained using illustrative examples, diagrams and problems from various domains of science
- More than 350 solved examples interspersed in the text
- 700 practice problems
- Statistical, logarithmic and exponential tables provided, making the text completely self-contained

CONTENTS

- 1. Matrices
- 2. Vectors in R2 and R3
- 3. Linear Transformations
- 4. Eigenvalues and Eigenvectors
- 5. Sequences
- 6. Functions and Their Graphs

7. Differential Equations in Mathematical Modelling

MATHEMATICAL/NUMERICAL METHODS

- 8. Successive Differentiation
- 9. Polynomial Approximation of Functions
- 10. Functions of Two Variables
- **11.** Geometry of Complex Numbers
- **12.** De Moivre's Theorem

ABOUT THE AUTHOR(S)

R. D. Sarma is an associate professor in the Department of Mathematics at Rajdhani College, New Delhi. He has over 19 years of teaching experience at the undergraduate and postgraduate levels. He has published 28 research papers in various international journals and has worked on several research projects under the UGC and CSIR. His primary areas of interest are fuzzy set theory and topology. He has attended several international conferences and has been involved in guiding students for their Ph.D. degrees .He has also worked as an associate professor in mathematics in the Eritrea Institute of Technology, under the aegis of the Ministry of Education, Eritrea.

Umesh Kumar is an assistant professor in the Department of Mathematics at Rajdhani College, New Delhi. He is an active member of the Mathematical Association of India and a life member of the Indian Mathematical Society and Indian Science Congress Association. His area of research is topology. He was recently awarded 'The Worshipful Company of International Bankers' Prize' for securing the first position in M.Sc. (Financial Mathematics) from King's College, London. Presently, he is deputed as a faculty member in the Cluster Innovation Centre, University of Delhi.

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Applied Mathematical Methods

Bhaskar Dasgupta

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ABOUT THE BOOK

This book covers the material vital for research in today's world and can be covered in a regular semester course. It is the consolidation of the efforts of teaching the compulsory first semester post-graduate applied mathematics course at the Department of Mechanical Engineering at IIT Kanpur in two successive years.

CONTENTS

- 1. Preliminary Background
- 2. Matrices and Linear Transformations
- 3. Operational Fundamentals of Linear Algebra
- 4. Systems of Linear Equations
- 5. Gauss Elimination Family of Methods
- 6. Special Systems and Special Methods
- 7. Numerical Aspects in Linear Systems
- 8. Eigenvalues and Eigenvectors
- 9. Diagonalization and Similarity Transformations
- 10. Jacobi and Givens Rotation Methods
- **11.** Householder Transformation and Tridiagonal Matrices
- 12. QR Decomposition Method
- **13.** Eigenvalue Problem of General Matrices
- 14. Singular Value Decomposition
- 15. Vector Spaces: Fundamental Concepts*
- **16.** Topics in Multivariate Calculus
- **17.** Vector Analysis: Curves and Surfaces
- **18.** Scalar and Vector Fields
- **19.** Polynomial Equations
- 20. Solution of Nonlinear Equations and Systems
- 21. Optimization: Introduction
- 22. Multivariate Optimization
- 23. Methods of Nonlinear Optimization*
- 24. Constrained Optimization
- 25. Linear and Quadratic Programming Problems*
- **26.** Interpolation and Approximation
- **27.** Basic Methods of Numerical Integration
- 28. Advanced Topics in Numerical Integration*
- 29. Numerical Solution of Ordinary Differential Equations
- 30. ODE Solutions: Advanced Issues
- 31. Existence and Uniqueness Theory
- 32. First Order Ordinary Differential Equations
- 33. Second Order Linear Homogeneous ODE's
- 34. Second Order Linear Non-Homogeneous ODE's
- 35. Higher Order Linear ODE's
- **36.** Laplace Transforms
- 37. ODE Systems

MATHEMATICAL/NUMERICAL METHODS



- 38. Stability of Dynamic Systems
- 39. Series Solutions and Special Functions
- 40. Sturm-Liouville Theory
- **41.** Fourier Series and Integrals
- **42.** Fourier Transforms
- **43.** Minimax Approximation*
- 44. Partial Di_erential Equations
- **45.** Analytic Functions
- **46.** Integrals in the Complex Plane
- 47. Singularities of Complex Functions
- 48. Variational Calculus*

ABOUT THE AUTHOR

Bhaskar Dasgupta is associate professor in the Department of Mechanical Engineering at Indian Institute of Technology Kanpur. He received his doctorate from the Indian Institute of Science, Bangalore, India in 1997. His ever-expanding research interests include topics in robotics such as serial and parallel manipulators, and motion planning methods; as well as nonlinear optimization, domain mapping, geometric modelling and protein docking. In his spare time, he takes a zealous interest in languages, literature, history and philosophy.

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MATHEMATICAL/NUMERICAL METHODS

NUMBER THEORY

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A Friendly Introduction to Number Theory, 4/e

A Friendly Introduction to Number Theory, 4th Edition is designed to introduce

students to the overall themes and methodology of mathematics through the detailed

study of one particular facet-number theory. Starting with nothing more than basic high school algebra, students are gradually led to the point of actively performing

mathematical research while getting a glimpse of current mathematical frontiers. The writing is appropriate for the undergraduate audience and includes many numerical

examples, which are analyzed for patterns and used to make conjectures. Emphasis is on the methods used for proving theorems rather than on specific results.



ISBN: 9789353433079

FEATURES

- 50 short chapters provide flexibility and options for instructors and students. A flowchart of chapter dependencies is included in this edition.
- Five basic steps are emphasized throughout the text to help readers develop a robust thought process:

Joseph H Silverman

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ABOUT THE BOOK

- Experimentation
- Pattern recognition
- Hypothesis formation
- Hypothesis testing
- Formal proof
- RSA cryptosystem, elliptic curves, and Fermat's Last Theorem are featured, showing the real-life applications of mathematics.

CONTENTS

- 1. What Is Number Theory?
- 2. Pythagorean Triples
- 3. Pythagorean Triples and the Unit Circle
- 4. Sums of Higher Powers and Fermat's Last Theorem
- 5. Divisibility and the Greatest Common Divisor
- 6. Linear Equations and the Greatest Common Divisor
- 7. Factorization and the Fundamental Theorem of Arithmetic
- 8. Congruences
- 9. Congruences, Powers, and Fermat's Little Theorem
- 10. Congruences, Powers, and Euler's Formula
- 11. Euler's Phi Function and the Chinese Remainder Theorem
- 12. Prime Numbers
- 13. Counting Primes
- 14. Mersenne Primes
- 15. Mersenne Primes and Perfect Numbers
- 16. Powers Modulo m and Successive Squaring
- 17. Computing kth Roots Modulo m
- 18. Powers, Roots, and "Unbreakable" Codes
- 19. Primality Testing and Carmichael Numbers
- 20. Squares Modulo p
- 21. Is -1 a Square Modulo p? Is 2?
- 22. Quadratic Reciprocity
- 23. Proof of Quadratic Reciprocity
- 24. Which Primes Are Sums of Two Squares?

NUMBER THEORY

- 25. Which Numbers Are Sums of Two Squares?
- 26. As Easy as One, Two, Three
- 27. Euler's Phi Function and Sums of Divisors
- 28. Powers Modulo p and Primitive Roots
- 29. Primitive Roots and Indices
- **30.** The Equation X4 + Y4 = Z4
- 31. Square-Triangular Numbers Revisited
- 32. Pell's Equation
- 33. Diophantine Approximation
- 34. Diophantine Approximation and Pell's Equation
- 35. Number Theory and Imaginary Numbers
- 36. The Gaussian Integers and Unique Factorization
- 37. Irrational Numbers and Transcendental Numbers
- 38. Binomial Coefficients and Pascal's Triangle
- 39. Fibonacci's Rabbits and Linear Recurrence Sequences
- 40. Oh, What a Beautiful Function
- 41. Cubic Curves and Elliptic Curves
- 42. Elliptic Curves with Few Rational Points
- **43.** Points on Elliptic Curves Modulo p
- **44.** Torsion Collections Modulo p and Bad Primes
- **45.** Defect Bounds and Modularity Patterns
- 46. Elliptic Curves and Fermat's Last Theorem
- **47.** The Topsy-Turvey World of Continued Fractions [online]
- 48. Continued Fractions, Square Roots, and Pell's Equation [online]
- **49.** Generating Functions [online]
- **50.** Sums of Powers [online]

ABOUT THE AUTHOR

Joseph H. Silverman is a Professor of Mathematics at Brown University. He received his Sc.B. at Brown and his Ph.D. at Harvard, after which he held positions at MIT and Boston University before joining the Brown faculty in 1988.

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NUMBER THEORY

PROBABILITY AND STATISTICS



ISBN: 9789356064034

A First Course in Probability, 10/e





ABOUT THE BOOK

A First Course in Probability offers an elementary introduction to the theory of probability for students in mathematics, statistics, engineering, and the sciences. Through clear and intuitive explanations, it attempts to present not only the mathematics of probability theory, but also the many diverse possible applications of this subject through numerous examples. The 10th Edition includes many new and updated problems, exercises, and text material chosen both for inherent interest and for use in building student intuition about probability.

FEATURES

- Analysis is unique to the text and elegantly designed. Examples include the knockout tournament and multiple players gambling ruin problem, along with results concerning the sum of uniform and the sum of geometric random variables.
- Intuitive explanations are supported with an abundance of examples to give readers a thorough introduction to both the theory and applications of probability.
- Three sets of exercises are given at the end of each chapter: Problems, Theoretical Exercises, and Self-Test Problems and Exercises.
- New Streamlined exposition focuses on clarity and deeper understanding.
- Many new and updated problems and exercises.
- New Examples such as Example 4n of Chapter 3, which deals with computing NCAA basketball tournament win probabilities, and Example 5b of Chapter 4, which introduces the friendship paradox.
- New Material on the Pareto distribution, on Poisson limit results, and on the Lorenz curve.

CONTENTS

- 1. Combinatorial Analysis
- 2. Axioms of Probability
- 3. Conditional Probability and Independence
- 4. Random Variables
- 5. Continuous Random Variables

- 6. Jointly Distributed Random Variables
- 7. Properties of Expectation
- 8. Limit Theorems 394
- 9. Additional Topics in Probability
- 10. Simulation

ABOUT THE AUTHOR

Sheldon M. Ross is a professor in the Department of Industrial Engineering and Operations Research at the University of Southern California. He received his Ph.D. in statistics at Stanford University in 1968. He has published many technical articles and textbooks in the areas of statistics and applied probability. Among his texts are A First Course in Probability, Introduction to Probability Models, Stochastic Processes, and Introductory Statistics. Professor Ross is the founding and continuing editor of the journal Probability in the Engineering and Informational Sciences, the Advisory Editor for International Journal of Quality Technology and Quantitative Management, and an Editorial Board Member of the Journal of Bond Trading and Management. He is a Fellow of the Institute of Mathematical Statistics and a recipient of the Humboldt US Senior Scientist Award.



Probability and Statistical Inference, 10/e

Robert V. Hogg | Elliot Tanis | Dale Zim

___ 564 | © 2021

ABOUT THE BOOK

Advances in computing technology – particularly in science and business – have increased the need for more statistical scientists to examine the huge amount of data being collected. Written by veteran statisticians, Probability and Statistical Inference, 10th Edition emphasizes the existence of variation in almost every process, and how the study of probability and statistics helps us understand this variation. This applied introduction to probability and statistics reinforces basic mathematical concepts with numerous real-world examples and applications to illustrate the relevance of key concepts. It is designed for a two-semester course,

but it can be adapted for a one-semester course. A good calculus background is needed, but no previous study of probability or statistics is required.

FEATURES

- Approximately 25 new examples and more than 75 new exercises have been added.
- A new section (Section 2.5) on the hypergeometric distribution is provided, adding to material previously scattered throughout the first and second chapters.
- Discussion of new topics includes the index of skewness and the laws of total probability for expectations and the variance.
- New material has been added on the topics of percentile matching and the invariance of maximum likelihood estimation.
- A new section on hypothesis testing for variances also includes confidence intervals for a variance and for the ratio of two variances.

CONTENTS

1. Probability

- 1.1 Properties of Probability
- 1.2 Methods of Enumeration
- **1.3** Conditional Probability
- 1.4 Independent Events
- 1.5 Bayes' Theorem

2. Discrete Distributions

- 2.1 Random Variables of the Discrete Type
- 2.2 Mathematical Expectation
- 2.3 Special Mathematical Expectations
- 2.4 The Binomial Distribution
- **2.5** The Hypergeometric Distribution
- 2.6 The Negative Binomial Distribution
- 2.7 The Poisson Distribution

3. Continuous Distributions

- 3.1 Random Variables of the Continuous Type
- 3.2 The Exponential, Gamma, and Chi-Square Distributions
- 3.3 The Normal Distribution
- 3.4 Additional Models



4. Bivariate Distributions

- 4.1 Bivariate Distributions of the Discrete Type
- 4.2 The Correlation Coefficient
- **4.3** Conditional Distributions
- 4.4 Bivariate Distributions of the Continuous Type
- 4.5 The Bivariate Normal Distribution

5. Distributions of Functions of Random Variables

- 5.1 Functions of One Random Variable
- **5.2** Transformations of Two Random Variables
- **5.3** Several Independent Random Variables
- 5.4 The Moment-Generating Function Technique
- 5.5 Random Functions Associated with Normal Distributions
- 5.6 The Central Limit Theorem
- 5.7 Approximations for Discrete Distributions
- 5.8 Chebyshev's Inequality and Convergence in Probability
- 5.9 Limiting Moment-Generating Functions

6. Point Estimation

- 6.1 Descriptive Statistics
- 6.2 Exploratory Data Analysis
- 6.3 Order Statistics
- 6.4 Maximum Likelihood and Method of Moments Estimation
- 6.5 A Simple Regression Problem
- 6.6 Asymptotic Distributions of Maximum Likelihood Estimators
- **6.7** Sufficient Statistics
- 6.8 Bayesian Estimation

7. Interval Estimation

- 7.1 Confidence Intervals for Means
- 7.2 Confidence Intervals for the Difference of Two Means
- 7.3 Confidence Intervals for Proportions
- 7.4 Sample Size
- 7.5 Distribution-Free Confidence Intervals for Percentiles
- 7.6 More Regression
- 7.7 Resampling Methods

8. Tests of Statistical Hypotheses

- 8.1 Tests About One Mean
- **8.2** Tests of the Equality of Two Means
- 8.3 Tests for Variances
- 8.4 Tests About Proportions
- 8.5 Some Distribution-Free Tests
- **8.6** Power of a Statistical Test
- 8.7 Best Critical Regions
- 8.8 Likelihood Ratio Tests

9. More Tests

- 9.1 Chi-Square Goodness-of-Fit Tests
- 9.2 Contingency Tables
- 9.3 One-Factor Analysis of Variance
- 9.4 Two-Way Analysis of Variance
- 9.5 General Factorial and 2k Factorial Designs
- 9.6 Tests Concerning Regression and Correlation
- 9.7 Statistical Quality Control

ABOUT THE AUTHOR

Robert V. Hogg (deceased), Professor Emeritus of Statistics at the University of Iowa since 2001, received his B.A. in mathematics at the University of Illinois and his M.S. and Ph.D. degrees in mathematics, specializing in actuarial sciences and statistics, from the University of Iowa. Known for his gift of humor and his passion for teaching, Hogg had far-reaching influence in the field of statistics. Throughout his career, Hogg played a major role in defining statistics as a unique academic field, and he almost literally ""wrote the book"" on the subject. He wrote more than 70 research articles and co-authored four books, including Introduction of Mathematical Statistics, 6th Edition with J. W. McKean and A.T. Craig; Applied Statistics for Engineers and Physical Scientists, 3rd Edition with J. Ledolter; and A Brief Course in Mathematical Statistics, 1st Edition with E.A. Tanis. His texts have become classroom standards used by hundreds of thousands of students. Elliot Tanis, Professor Emeritus of Mathematics at Hope College, received his M.S. and Ph.D. degrees from the University of Iowa. Tanis is the co-author of A Brief Course in Mathematical Statistics with R. Hogg and Probability and Statistics: Explorations with MAPLE, 2nd Edition with Z. Karian. He has authored over 30 publications on statistics and is a past chairman and governor of the Michigan MAA, which presented him with both its Distinguished Teaching and Distinguished Service Awards. He taught at Hope for 35 years and in 1989 received the HOPE Award (Hope's Outstanding Professor Educator) for his excellence in teaching. In addition to his academic interests, Dr. Tanis is also an avid tennis player and devoted Hope sports fan. Dale Zimmerman is the Robert V. Hogg Professor in the Department of Statistics and Actuarial Science at the University of Iowa.



Introduction to Mathematical Statistics, 8/e



ABOUT THE BOOK

Introduction to Mathematical Statistics by Hogg, McKean, and Craig enhances student comprehension and retention with numerous, illustrative examples and exercises. Classical statistical inference procedures in estimation and testing are explored extensively, and the text's flexible organization makes it ideal for a range of mathematical statistics courses. Substantial changes to the 8th Edition – many based on user feedback - help students appreciate the connection between statistical theory and statistical practice, while other changes enhance the development

FEATURES

- Many additional real data sets to illustrate statistical methods or compare methods.
- Expanded use of the statistical software R, a powerful statistical language which is free and can run on all three main platforms.
- Expanded discussion of iterated integrals, with added figures to clarify discussion.
- Several important topics have been added, including a subsection on the bivariate normal distribution, Tukey's multiple comparison procedure and confidence intervals for the correlation coefficients.
- Discussion on standard errors for estimates obtained by bootstrapping the sample is now included.

CONTENTS

- 1. Probability and Distributions
- 2. Multivariate Distributions
- **3.** Some Special Distributions
- **4.** Some Elementary Statistical Inferences
- **5.** Consistency and Limiting Distributions
- 6. Maximum Likelihood Methods
- 7. Sufficiency
- 8. Optimal Tests of Hypotheses
- 9. Inferences About Normal Linear Models

ABOUT THE AUTHOR(S)

Robert V. Hogg, University of Iowa

- 10. Nonparametric and Robust Statistics
- **11.** Bayesian Statistics
- Appendices:
 - A. Mathematical Comments
 - B. R Primer
 - C. Lists of Common Distributions
 - D. Table of Distributions
 - E. References
 - F. Answers to Selected Exercises

Joeseph McKean, Allen T. Craig, Late, Professor of Statistics, University of Iowa





FEATURES

- Many new examples on important current engineering and scientific data further strengthen the text's orientation towards an applications-based introduction to statistics
- Added graphs illustrating P-values appear in several examples along with an interpretation
- More details about using R commands make it easy for students to check calculations on their own laptop or tablet, while reading an example.

CONTENTS

- 1. Introduction
- 2. Organization and Description of Data
- 3. Probability
- 4. Probability Distributions
- 5. Probability Densities
- 6. Sampling Distributions
- 7. Inferences Concerning a Mean
- 8. Comparing Two Treatments
- **9.** Inferences Concerning Variances
- **10.** Inferences Concerning Proportions
- **11.** Regression Analysis

ABOUT THE AUTHOR

Richard A. Johnson University of Wisconsin–Madison

Miller and Freund's Probability and Statistics for Engineering, 9/e

Richard A. Johnson

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ABOUT THE BOOK

Miller & Freund's Probability and Statistics for Engineers is rich in exercises and examples, and explores both elementary probability and basic statistics, with an emphasis on engineering and science applications. Much of the data has been collected from the author's own consulting experience and from discussions with scientists and engineers about the use of statistics in their fields. In later chapters, the text emphasizes designed experiments, especially two-level factorial design. The Ninth Edition includes several new datasets and examples showing application of statistics in scientific investigations, familiarizing students with the latest methods, and readying them to become real-world engineers and scientists.

- Key formulas are stressed and calculation formulas are downplayed. Computation formulas are set in the context of an application which only requires all, or mostly all, integer arithmetic, and now appear only at the end of sections. Students can then check their results with their choice of software.
- All examples are now numbered within each chapter.
- New data-based exercises feature real applications to help stimulate interest and strengthen a student's appreciation of the role of statistics in engineering applications.
- 12. Analysis of Variance
- 13. Factorial Experimentation
- 14. Nonparametric Tests
- **15.** The Statistical Content of Quality-Improvement Programs

16. Application to Reliability and Life Testing Appendix A Bibliography Appendix B Statistical Tables Appendix C Using the R Software Program Appendix D Answers to Odd-Numbered Exercises





Probability and Statistics, 4/e

Morris H. DeGroot | Mark J. Schervish

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ABOUT THE BOOK

The revision of this well-respected text presents a balanced approach of the classical and Bayesian methods and now includes a chapter on simulation (including Markov chain Monte Carlo and the Bootstrap), coverage of residual analysis in linear models, and many examples using real data.

Probability & Statistics, Fourth Edition, was written for a one- or two-semester probability and statistics course. This course is offered primarily at four-year institutions and taken mostly by sophomore and junior level students majoring in mathematics or statistics. Calculus is a prerequisite, and a familiarity with the concepts and elementary properties of vectors and matrices is a plus.

FEATURES

- Brief introductions in each technical section give readers a hint about what they are going to encounter, while summaries list the most important ideas.
- In addition to examples using current data, some elementary concepts of probability are illustrated by famous examples such as the birthday problem, the tennis tournament problem, the matching problem, and the collector's problem.
- Special features include sections on Markov chains, the gambler's ruin problem, and utility and preferences among gamblers. These topics are presented in an elementary fashion and can be omitted without loss of continuity.
- Optional sections of the book are indicated by an asterisk in the Table of Contents.
- Chapters 1—5 are devoted to probability and can serve as the text for a one-semester course on probability. Independence is now introduced after conditional probability.
- Chapters 6—10 are devoted to statistical inference. Both classical and Bayesian statistical methods are developed in an integrated presentation which will be useful to students when applying the concepts to the real world.

CONTENTS

- 1. Introduction to Probability
- 2. Conditional Probability
- 3. Random Variables and Distributions
- 4. Expectation
- **5.** Special Distributions
- 6. Large Random Samples
- 7. Estimation
- 8. Sampling Distributions of Estimators
- 9. Testing Hypotheses
- **10.** Categorical Data and Nonparametric Methods
- **11.** Linear Statistical Models



John E. Freund's Mathematical Statistics with Applications, 8/e

ABOUT THE BOOK

John E. Freund's *Mathematical Statistics with Applications*, Eighth Edition, provides a calculus-based introduction to the theory and application of statistics, based on comprehensive coverage that reflects the latest in statistical thinking, the teaching of statistics, and current practices.

This text is appropriate for a two-semester or three-quarter calculus-based course in Introduction to Mathematical Statistics. It can also be used for a single-semester course emphasizing probability, probability distributions and densities, sampling, and classical statistical inference

FEATURES

- "The Theory in Practice" sections at the end of every chapter give students the chance to apply the methods they've learned.
- More than 1,200 exercises offer a wide variety to choose from in creating assignments, tests, and class work. Many of these exercises offer the opportunity to use technology so that students can understand the role of computers in factoring and analyzing statistical data.
- Comprehensive coverage of statistical theories students have appreciated for generations.
- Comprehensive appendices summarize the properties of the special probability distributions and density functions, making this text an invaluable reference.

CONTENTS

- 1. Introduction
- 2. Probability
- 3. Probability Distributions and Probability Densities
- 4. Mathematical Expectation
- 5. Special Probability Distributions
- 6. Special Probability Densities
- 7. Functions of Random Variables
- 8. Sampling Distributions
- 9. Decision Theory
- 10. Point Estimation

- **11.** Interval Estimation
- **12.** Hypothesis Testing
- **13.** Tests of Hypotheses Involving Means, Variances, and Proportions
- 14. Regression and Correlation
- 15. Appendix: Sums and Products
- 16. Appendix: Special Probability Distributions
- 17. Appendix: Special Probability Densities
- 18. Statistical tables

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Probability and Statistics

E. Rukmangadachari

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ABOUT THE BOOK

This book is designed for engineering students studying the core paper on probability and statistics during their second or third years. It includes detailed explanation of theory with numerous examples and exercises, as well as relevant references to engineering applications. Each chapter also has numerous objective type questions, and answers and hints are provided for all the exercise problems and objective type questions.

FEATURES

- Detailed examination of special probability distributions
- A separate chapter on estimation theory

CONTENTS

- 1. Probability
- 2. Probability Distribution
- 3. Special Distribution
- 4. Sampling Distributions
- **5.** Estimation Theory

ABOUT THE AUTHOR(S)

- Detailed examination of regression and correlation analysis
- A separate chapter on queuing theory
- 6. Inferences Concerning Means and Proportions
- 7. Tests of Significance
- 8. Curve Fitting: Regression and Correlation Analysis
- 9. Queueing Theory

E Rukmangadachari is former head of Computer Science and Engineering as well as Humanities and Sciences at Malla Reddy Engineering College, Secunderabad. He is an MA from Osmania University, and an M.PHIL. and Ph.D. degree holder from Sri Venkateswara University, Thirupathi.



ISBN: 9789332519084

Probability and Statistics for Engineers and Scientists, 9/e

Ronald E. Walpole | Raymond H. Myers | Sharon L. Myers | Keying Ye





ABOUT THE BOOK

This classic text provides a rigorous introduction to basic probability theory and statistical inference, with a unique balance between theory and methodology. Interesting, relevant applications use real data from actual studies, showing how the concepts and methods can be used to solve problems in the field. This revision focuses on improved clarity and deeper understanding.

FEATURES

- The balance between theory and applications offers mathematical support to enhance coverage when necessary, giving engineers and scientists the proper mathematical context for statistical tools and methods.
- Mathematical level: this text assumes one semester of differential and integral calculus as a prerequisite.
 - Calculus is confined to elementary probability theory and probability distributions (Chapters 2 7).
 - Matrix algebra is used modestly in coverage of linear regression material (Chapters 11 12).
 - Linear algebra and the use of matrices are applied in Chapters 11 15, where treatment of linear regression and analysis of variance is covered.
- Compelling exercise sets challenge students to use the concepts to solve problems that occur in many real-life scientific and engineering situations. Many exercises contain real data from studies in the fields of biomedical, bioengineering, business, computing, etc.
- Real-life applications of the Poisson, binomial, and hypergeometric distributions generate student interest using topics such as flaws in manufactured copper wire, highway potholes, hospital patient traffic, airport luggage screening, and homeland security.

CONTENTS

- 1. Introduction to Statistics and Data Analysis
- 2. Probability
- 3. Random Variables and Probability Distributions
- 4. Mathematical Expectation
- 5. Some Discrete Probability Distributions
- 6. Some Continuous Probability Distributions
- 7. Functions of Random Variables (Optional)
- 8. Sampling Distributions and More Graphical Tools
- 9. One- and Two-Sample Estimation Problems
- **10.** One- and Two-Sample Tests of Hypotheses

ABOUT THE AUTHOR(S)

- Ronald E. Walpole
- Raymond H. Myers, Virginia Polytechnic Institute
- Sharon L. Myers
- Keying E. Ye, Virginia Polytechnic Institute & State University

- 11. Simple Linear Regression and Correlation
- **12.** Multiple Linear Regression and Certain Nonlinear Regression Models
- 13. One-Factor Experiments: General
- 14. Factorial Experiments (Two or More Factors)
- 15. 2k Factorial Experiments and Fractions
- **16.** Nonparametric Statistics
- 17. Statistical Quality Control
- A. Statistical Tables and Proofs
- B. Answers to Odd-Numbered Non-Review Exercises

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REAL ANALYSIS



ISBN: 9789353432768

An Introduction to Analysis, 4/e

🖌 William Wade

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ABOUT THE BOOK

This text prepares students for future courses that use analytic ideas, such as real and complex analysis, partial and ordinary differential equations, numerical analysis, fluid mechanics, and differential geometry. The book is designed to challenge advanced students while encouraging and helping weaker students. Offering readability, practicality and flexibility, Wade presents fundamental theorems and ideas from a practical viewpoint, showing students the motivation behind the mathematics and enabling them to construct their own proofs.

FEATURES

- The practical focus explains assumptions so that students learn the motivation behind the mathematics and are able to construct their own proofs.
- Theoretical exercises of medium difficulty have been added throughout the book.
- New True/False questions in the first six chapters confront common misconceptions that students sometimes acquire at this level.
- **Early introduction of the fundamental goals of analysis** refers and examines how a limit operation interacts with algebraic operation.
- Separate coverage of topology and analysis presents purely computational material first, followed by topological material in alternate chapters.
- More than 200 worked examples and 600 exercises encourage students to test comprehension of concepts, while using techniques in other contexts.

CONTENTS

- 1. The Real Number System
- 2. Sequences in R
- 3. Continuity on R
- 4. Differentiability on R
- 5. Integrability on R
- 6. Infinite Series of Real Numbers
- 7. Infinite Series of Functions

- 8. Euclidean Spaces
- 9. Convergence in Rn
- 10. Metric Spaces
- 11. Differentiability on Rn
- **12.** Integration on Rn
- 13. Fundamental Theorems of Vector Calculus
- 14. Fourier Series

ABOUT THE AUTHOR

William Wade received his PhD in harmonic analysis from the University of California—Riverside. He has been a professor of the Department of Mathematics at the University of Tennessee for more than forty years. During that time, he has received multiple awards including two Fulbright Scholarships, the Chancellor's Award for Research and Creative Achievements, the Dean's Award for Extraordinary Service, and the National Alumni Association Outstanding Teaching Award.





Real Analysis, 4/e Halsey Royden | Patrick Fitzpatrick

ABOUT THE BOOK

Real Analysis, Fourth Edition, covers the basic material that every graduate student should know in the classical theory of functions of a real variable, measure and integration theory, and some of the more important and elementary topics in general topology and normed linear space theory. This text assumes a general background in undergraduate mathematics and familiarity with the material covered in an undergraduate course on the fundamental concepts of analysis. Patrick Fitzpatrick of the University of Maryland—College Park spearheaded this revision of Halsey Royden's classic text

FEATURES

- Independent, modular chapters give instructors the freedom to arrange the material into a course according that suits their needs. A chart in the text gives the essential dependencies.
- Content is divided into three parts:
 - Part 1: Classical theory of functions, including the classical Banach spaces
 - Part 2: General topology and the theory of general Banach spaces
 - Part 3: Abstract treatment of measure and integration
- Throughout the text, an understanding of the linkages between the three parts is fostered. The expanded collection of problems range from those that confirm understanding of basic results and ideas to those that are quite chal¬lenging; many problems foreshadow future developments.

CONTENTS

Part I: Lebesgue Integration For Functions Of A Single Real Variable

- 1. The Real Numbers: Sets, Sequences and Functions
- 2. Lebesgue Measure
- 3. Lebesgue Measurable Functions
- 4. Lebesgue Integration
- 5. Lebesgue Integration: Further Topics
- 6. Differentiation and Integration
- 7. The Spaces: Completeness and Approximation
- 8. The Spaces: Duality and Weak Convergence

Part II: Abstract Spaces: Metric, Topological, And Hilbert

- 9. Metric Spaces: General Properties
- **10.** Metric Spaces: Three Fundamental Theorems
- 11. Topological Spaces: General Properties

- **12.** Topological Spaces: Three Fundamental Theorems
- **13.** Continuous Linear Operators Between Banach Spaces
- 14. Duality for Normed Linear Spaces
- 15. Compactness Regained: The Weak Topology
- 16. Continuous Linear Operators on Hilbert Spaces

Part III: Measure And Integration: General Theory

- **17.** General Measure Spaces: Their Properties and Construction
- 18. Integration Over General Measure Spaces
- **19.** General Spaces: Completeness, Duality and Weak Convergence
- 20. The Construction of Particular Measures
- **21.** Measure and Topology
- **22.** Invariant Measures

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REAL ANALYSIS





ABOUT THE BOOK

This text book is designed for an undergraduate course on mathematics. It covers the basic material that every graduate student should know in the classical theory of functions of real variables, measures, limits and continuity. This text book offers readability, practicality and flexibility. It presents fundamental theorems and ideas from a practical viewpoint, showing students the motivation behind mathematics and enabling them to construct their own proofs.

FEATURES

- Comprehensive coverage of sequence and series
- Detailed coverage of topics like measure theory, set theory, limits and continuity
- The theory is well explained, with an equal number of theorems and examples for all topics, including Lp spaces, real number system, measure theory and sequence and series
- A very flexible presentation with a uniform writing style and notation, covering the material in small sections, which allows instructors and students to adapt this book to their syllabus

CONTENTS

- 1. Basic Properties of the Real number system
- 2. Some Finer Aspects of Set Theory
- 3. Sequences and Series
- 4. Topological aspects of the real line
- **5.** Limits and Continuity
- 6. Differentiation
- 7. Functions of Bounded variation

- 8. Riemann Integration
- 9. Sequences and series of functions
- 10. Power series and special functions
- 11. Fourier Series
- **12.** Real-valued Functions of two real variables
- 13. Lebesgue Measure and Integration
- 14. Lp Spaces

ABOUT THE AUTHOR

V. Karunakaran has 35 years of research experience specializing in real, complex and functional analysis. He was a life member of the Indian Mathematical Society, Association of Mathematics Teachers of India, a fellow of the Forum D'Analystes, Chennai, and a regular reviewer for Zentralblatt für Mathematik.

REAL ANALYSIS

TOPOLOGY



ISBN: 9789353432775

Topology, Updated 2/e

James R. Munkres

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ABOUT THE BOOK

This text is designed to provide instructors with a convenient single text resource for bridging between general and algebraic topology courses. Two separate, distinct sections (one on general, point set topology, the other on algebraic topology) are each suitable for a one-semester course and are based around the same set of basic, core topics. Optional, independent topics and applications can be studied and developed in depth depending on course needs and preferences.

FEATURES

- New! Greatly expanded, full-semester coverage of algebraic topology—Extensive treatment of the fundamental group and covering spaces. What follows is a wealth of applications—to the topology of the plane (including the Jordan curve theorem), to the classification of compact surfaces, and to the classification of covering spaces. A final chapter provides an application to group theory itself.
- Follows the present-day trend in the teaching of topology which explores the subject much more extensively with one semester devoted to general topology and a second to algebraic topology.
- Advanced topics—Such as metrization and imbedding theorems, function spaces, and dimension theory are covered after connectedness and compactness.
- Order of topics proceeds naturally from the familiar to the unfamiliar—Begins with the familiar set theory, moves on to a thorough and careful treatment of topological spaces, then explores connectedness and compactness (with their many ties to calculus and analysis), and then branches out to the new and different topics mentioned above.

II. Algebraic Topology.

9. The Fundamental Group.

12. Classification of Surfaces.

10. Separation Theorems in the Plane.

11. The Seifert-van Kampen Theorem.

13. Classification of Covering Spaces.

14. Applications to Group Theory.

- Many examples and figures—Exploits six basic counterexamples repeatedly.
- Exercises—Varied in difficulty from the routine to the challenging.

CONTENTS

I. General Topology.

- **1.** Set Theory and Logic.
- 2. Topological Spaces and Continuous Functions.
- **3.** Connectedness and Compactness.
- 4. Countability and Separation Axioms.
- 5. The Tychonoff Theorem.
- 6. Metrization Theorems and Paracompactness.
- 7. Complete Metric Spaces and Function Spaces.
- **8.** Baire Spaces and Dimension Theory.

ABOUT THE AUTHOR

James Raymond Munkres is a Professor Emeritus of mathematics at MIT and the author of several texts in the area of topology, including Topology, Analysis on Manifolds, Elements of Algebraic Topology, and Elementary Differential Topology.

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TOPOLOG



Introduction to Topology Colin Adams | Robert Franzosa

ABOUT THE BOOK

This book introduces topology as an important and fascinating mathematics discipline. Students learn first the basics of point-set topology, which is enhanced by the real-world application of these concepts to science, economics, and engineering as well as other areas of mathematics. The second half of the book focuses on topics like knots, robotics, and graphs. The text is written in an accessible way for a range of undergraduates to understand the usefulness and importance of the application of topology to other fields.

FEATURES

- Theoretical and applied approach- the authors focus on the basic concepts of
- Intuitive and accessibly written text
- Rigorous presentation of the mathematics with intuitive descriptions and discussions to increase student understand.
- Examples of real world application keep students engrossed in the material
- Numerous figures allow students to visualize and understand the material presented

CONTENTS

- 1. Introduction
- 2. Topological Spaces
- 3. Interior, Closure, and Boundary
- 4. Creating New Topological Spaces
- 5. Continuous Functions and Homeomorphisms
- 6. Metric Spaces
- 7. Connectedness
- 8. Compactness

- 9. Dynamical Systems and Chaos
- 10. Homotopy and Degree Theory
- 11. Fixed Point Theorems and Applications
- 12. Embeddings
- 13. Knots
- 14. Graphs and Topology
- 15. Manifolds and Cosmology

TOPOLOGY

TRANSITION TO ADVANCED MATH



ISBN: 9789353432744



ABOUT THE BOOK

Chapter Zero: Fundamental Notions of Abstract Mathematics is designed for the sophomore/junior level Introduction to Advanced Mathematics course. Written in a modified R.L. Moore fashion, it offers a unique approach in which students construct their own understandings. However, while students are called upon to write their own proofs, they are also encouraged to work in groups. The text also offers "proof sketches" and helpful technique tips to help students as they develop their proof writing skills.

FEATURES

- NEW! Coverage of Isomorphisms and Graph Theory.
- Exercise sections have been improved by smoothing out the grade of difficulty.
- Proof Sketches are woven throughout the early chapters of the text, assisting students with proof techniques.
 Logic is used as a tool for analyzing the content of mathematical assertions and for constructing valid

5. Functions

7. Cardinality8. The Real Numbers

6. Elementary Number Theory

- Logic is used as a cool of analyzing the content of mathematical assertions and for constructing van mathematical proofs.
- Rigorous axiomatic treatment of set theory is introduced in Appendices A and B.

CONTENTS

- 1. Logic
- 2. Sets
- 3. Induction
- 4. Relations

ABOUT THE AUTHOR

Carol Schumacher, Professor of Mathematics, Kenyon College.

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TRANSITION TO ADVANCED MATH



Mathematical Thinking: Problem-Solving and Proofs, 2/e



ABOUT THE BOOK

This text is designed to prepare students *thoroughly* in the logical thinking skills necessary to understand and communicate fundamental ideas and proofs in mathematics—skills vital for success throughout the upper class mathematics curriculum. It begins by discussing mathematical language and proof techniques including induction, applies them to easily-understood questions in elementary number theory and counting, and then develops additional techniques of proof via important topics in discrete and continuous mathematics. The stimulating exercises are *acclaimed for their exceptional quality*.

FEATURES

- **Emphasis on understanding rather than manipulation**—Stresses full comprehension rather than rote symbolic manipulation for mastery of proof techniques and mathematical ideas.
- **Engaging examples**—Interesting applications introduce and motivate the underlying mathematics.
- Hints for selected exercises—Provides immediate hints for some exercises and hints for others in an appendix.
- Superior exercise sets—Offers over 850 exercises ranging from relatively straightforward applications of ideas in the text to subtle problems requiring some ingenuity.
- Gradation of exercises—Distinguishes easier exercises by (-), harder by (+), and particularly valuable or instructive exercises by (!).

CONTENTS

PART I. ELEMENTARY CONCEPTS.

- 1. Numbers, Sets and Functions.
- 2. Language and Proofs.
- 3. Induction.
- 4. Bijections and Cardinality.

PART II. PROPERTIES OF NUMBERS.

- 5. Combinatorial Reasoning.
- 6. Divisibility.
- 7. Modular Arithmetic.
- 8. The Rational Numbers.

PART III. DISCRETE MATHEMATICS.

- 9. Probability.
- 10. Two Principles of Counting.
- **11.** Graph Theory.

12. Recurrence Relations. PART IV. CONTINUOUS MATHEMATICS.

- **13.** The Real Numbers.
- 13. The Real Numbers.
- 14. Sequences and Series.15. Continuous Functions.
- **16.** Differentiation.
- **17.** Integration.
- **18.** The Complex Numbers.

ABOUT THE AUTHOR

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