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KEY=ALGEBRA - SHANIA CRUZ

Closing the achievement gap the impact of standards-based education reform on student performance : draft report for commissioners' review.

DIANE Publishing

Virginia State Documents

Open Middle Math

Problems That Unlock Student Thinking, 6-12

Imagine that you assign a math problem and your students, instead of getting discouraged after not solving it on the first attempt, start working harder--as if on a quest to figure out the answer. They talk to each other and enthusiastically share their discoveries. What could possibly make this fantastic scenario come true? The answer is: the Open Middle math problems and strategies in this book. Open Middle Math by Robert Kaplinsky gives middle and high school teachers the problems and planning guidance that will encourage students to see mathematics in an entirely different light. These challenging and rewarding Open Middle math problems will help you see your students build genuine conceptual understanding, perseverance, and creativity. Inside, you'll learn how to: Implement Open Middle math problems that are simultaneously accessible for both students who are struggling and those looking for more challenge. Select and create Open Middle math problems that will help you detect students' misconceptions and strengthen their conceptual understanding. Prepare for and facilitate powerful classroom conversations using Open Middle math problems. Access resources that will help you continue learning beyond this book. With these practical and intuitive strategies, extensive resources, and Robert's own stories about his journey learning to use Open Middle math problems successfully, you will be able to support, challenge, and motivate all your students.

Linear Algebra

Springer Science & Business Media *This popular and successful text was originally written for a one-semester course in linear algebra at the sophomore undergraduate level. Consequently, the book deals almost exclusively with real finite dimensional vector spaces, but in a setting and formulation that permits easy generalisation to abstract vector spaces. A wide selection of examples of vector spaces and linear transformation is presented to serve as a testing ground for the theory. In the second edition, a new chapter on Jordan normal form was added which reappears here in expanded form as the second goal of this new edition, after the principal axis theorem. To achieve these goals in one semester it is necessary to follow a straight path, but this is compensated by a wide selection of examples and exercises. In addition, the author includes an introduction to invariant theory to show that linear algebra alone is incapable of solving these canonical forms problems. A compact, but mathematically clean introduction to linear algebra with particular emphasis on topics in abstract algebra, the theory of differential equations, and group representation theory.*

The Beginnings and Evolution of Algebra

Cambridge University Press *The elements of algebra were known to the ancient Mesopotamians at least 4000 years ago. Today algebra stands as one of the cornerstones of modern mathematics. How then did the subject evolve? How did its constituent ideas and concepts arise, and how have they changed over the years? These are the questions that the authors address in this work. The authors challenge the existing view that the development of algebra was driven by the investigation of determinate equations and in particular their solution by radicals. In short they claim that the study of indeterminate equations was no less important. Historians of mathematics, as well as working algebraists who want to look into the history of their subject, will find this an illuminating read.*

Free Algebras and PI-algebras

Graduate Course in Algebra

Springer Verlag *The book is devoted to the combinatorial theory of polynomial algebras, free associative and free Lie algebras, and algebras with polynomial identities. It also examines the structure of automorphism groups of free and relatively free algebras. It is based on graduate courses and short cycles of lectures presented by the author at several universities and its goal is to involve the reader as soon as possible in the research area, to make him or her able to read books and papers on the considered topics. It contains both classical and contemporary results and methods. A specific feature of the book is that it includes as its inseparable part more than 250 exercises and examples with detailed hints (50 % of the numbered statements), some of them treating serious mathematical results. The exposition is accessible for graduate and advanced undergraduate students with standard background on linear algebra and some elements of ring theory and group theory. The professional mathematician working in the field of algebra and other related topics also will find the book useful for his or her research and teaching. TOC:Introduction 1. Commutative, Associative and Lie Algebras: Basic properties of algebras; Free algebras; The Poincaré-Birkhoff-Witt theorem. 2. Algebras with Polynomial Identities: Definitions and examples of PI-Algebras; Varieties and relatively free algebras; The theorem of Birkhoff. 3. The Specht Problem: The finite basis property; Lie algebras in characteristic 2. 4. Numerical Invariants of T-Ideals: Graded vector spaces; Homogeneous and multilinear polynomial identities; Proper polynomial identities. 5. Polynomial Identities of Concrete Algebras: Polynomial identities of the Grassmann algebra; Polynomial identities of the upper triangular matrices. 6. Methods of Commutative Algebra: Rational Hilbert series; Nonmatrix polynomial identities; Commutative and noncommutative invariant theory. 7. Polynomial Identities of the Matrix Algebras: The Amitsur-Levitzki theorem; Generic matrices; Central polynomials; Various identities of matrices. 8. Multilinear Polynomial Identities: The codimension theorem of Regev; Algebras with polynomial growth of codimensions; The Nagata-Higman theorem; The theory of Kemer. 9. Finitely Generated PI-Algebras: The problems of Burnside and Kurosch; The Shirshov theorem; Growth of algebras and Gelfand-Kirillov dimension; Gelfand-Kirillov dimension of PI-Algebras. 10. Automorphisms of Free Algebras: Automorphisms of groups and algebras; The polynomial algebra in two variables; The free associative algebra of rank two; Exponential automorphisms; Automorphisms of relatively free algebras. 11. Free Lie Algebras and Their Automorphisms: Bases and subalgebras of free Lie algebras; Automorphisms of free Lie algebras; Automorphisms of relatively free Lie algebras. 12. The Method of Representation Theory: Representations of finite groups; The symmetric group; Multilinear polynomial identities; The action of the general linear group; Proper polynomial identities; Polynomial identities of matrices.*

Linear Algebra Done Right

Springer Science & Business Media *This text for a second course in linear algebra, aimed at math majors and graduates, adopts a novel approach by banishing determinants to the end of the book and focusing on understanding the structure of linear operators on vector spaces. The author has taken unusual care to motivate concepts and to simplify proofs. For example, the book presents - without having defined determinants - a clean proof that every linear operator on a finite-dimensional complex vector space has an eigenvalue. The book starts by discussing vector spaces, linear independence, span, basics, and dimension. Students are introduced to inner-product spaces in the first half of the book and shortly thereafter to the finite- dimensional spectral theorem. A variety of interesting exercises in each chapter helps students understand and manipulate the objects of linear algebra. This second edition features new chapters on diagonal matrices, on linear functionals and adjoints, and on the spectral theorem; some sections, such as those on self-adjoint and normal operators, have been entirely rewritten; and hundreds of minor improvements have been made throughout the text.*

The Algebraic Theory of Quadratic Forms

Linear Algebra in Action

American Mathematical Soc. *Linear algebra permeates mathematics, perhaps more so than any other single subject. It plays an essential role in pure and applied mathematics, statistics, computer science, and many aspects of physics and engineering. This book conveys in a user-friendly way the basic and advanced techniques of linear algebra from the point of view of a working analyst. The techniques are illustrated by a wide sample of applications and examples that are chosen to highlight the tools of the trade. In short, this is material that the author wishes he had been taught as a graduate student. Roughly the first third of the book covers the basic material of a first course in linear algebra. The remaining chapters are devoted to applications drawn from vector calculus, numerical analysis, control theory, complex analysis, convexity and functional analysis. In particular, fixed point theorems, extremal problems, matrix equations, zero location and eigenvalue location problems, and matrices with nonnegative entries are discussed. Appendices on useful facts from analysis and supplementary information from complex function theory are also provided for the convenience of the reader. The book is suitable as a text or supplementary reference for a variety of courses on linear algebra and its applications, as well as for self-study.*

A First Course in Abstract Algebra

Addison Wesley Publishing Company *Considered a classic by many, A First Course in Abstract Algebra is an in-depth, introductory text which gives students a firm foundation for more specialized work by emphasizing an understanding of the nature of algebraic structures. The Sixth Edition continues its tradition of teaching in a classical manner, while integrating field theory and new exercises.*

A First Course in Abstract Algebra

Pearson College Division *Written as only Professor Rotman can pull off: spectacularly clear yet rigorous without condescension. This introduction to abstract algebra is designed to make the study of all required topics and the reading and writing of proofs both accessible and enjoyable for students encountering the subject for the first time.*

Algebraic Geometry

An Introduction to Birational Geometry of Algebraic Varieties

Springer *The aim of this book is to introduce the reader to the geometric theory of algebraic varieties, in particular to the birational geometry of algebraic varieties. This volume grew out of the author's book in Japanese published in 3 volumes by Iwanami, Tokyo, in 1977. While writing this English version, the author has tried to rearrange and rewrite the original material so that even beginners can read it easily without referring to other books, such as textbooks on commutative algebra. The reader is only expected to know the definition of Noetherin rings and the statement of the Hilbert basis theorem. The new chapters 1, 2, and 10 have been expanded. In particular, the exposition of D-dimension theory, although shorter, is more complete than in the old version. However, to keep the book of manageable size, the latter parts of Chapters 6, 9, and 11 have been removed. I thank Mr. A. Sevenster for encouraging me to write this new version, and Professors K. K. Kubota in Kentucky and P. M. H. Wilson in Cam bridge for their careful and critical reading of the English manuscripts and typescripts. I held seminars based on the material in this book at The University of Tokyo, where a large number of valuable comments and suggestions were given by students Iwamiya, Kawamata, Norimatsu, Tobita, Tsushima, Maeda, Sakamoto, Tsunoda, Chou, Fujiwara, Suzuki, and Matsuda.*

Elementary Algebraic Geometry

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

Robert Steinberg Collected Papers

American Mathematical Soc. *This volume is a collection of published papers by Robert Steinberg. It contains all of his published papers on group theory, including those on "special" representations (now called Steinberg representations), Coxeter groups, regular nilpotent elements and Galois cohomology. After each paper, there is a section, "Comments on the papers", that contains minor corrections and clarifications and explains how ideas and results have evolved and been used since they first appeared.*

Fields and Rings

University of Chicago Press *This book combines in one volume Irving Kaplansky's lecture notes on the theory of fields, ring theory, and homological dimensions of rings and modules. "In all three parts of this book the author lives up to his reputation as a first-rate mathematical stylist. Throughout the work the clarity and precision of the presentation is not only a source of constant pleasure but will enable the neophyte to master the material here presented with dispatch and ease."—A. Rosenberg, Mathematical Reviews*

Amsco's Integrated Algebra 1

A new textbook designed for complete coverage of the New York State Core Curriculum for Integrated Algebra.

Computational Invariant Theory

Springer Science & Business Media *This book, the first volume of a subseries on "Invariant Theory and Algebraic Transformation Groups", provides a comprehensive and up-to-date overview of the algorithmic aspects of invariant theory. Numerous illustrative examples and a careful selection of proofs make the book accessible to non-specialists.*

Why Don't Students Like School?

A Cognitive Scientist Answers Questions About How the Mind Works and What It Means for the Classroom

John Wiley & Sons *Easy-to-apply, scientifically-based approaches for engaging students in the classroom Cognitive scientist Dan Willingham focuses his acclaimed research on the biological and cognitive basis of learning. His book will help teachers improve their practice by explaining how they and their students think and learn. It reveals-the importance of story, emotion, memory, context, and routine in building knowledge and creating lasting learning experiences. Nine, easy-to-understand principles with clear applications for the classroom Includes surprising findings, such as that intelligence is malleable, and that you cannot develop "thinking skills" without facts How an understanding of the brain's workings can help teachers hone their teaching skills "Mr. Willingham's answers apply just as well outside the classroom. Corporate trainers, marketers and, not least, parents -anyone who cares about how we learn-should find his book valuable reading." —Wall Street Journal*

Positive Polynomials and Sums of Squares

American Mathematical Soc. *The study of positive polynomials brings together algebra, geometry and analysis. The subject is of fundamental importance in real algebraic geometry when studying the properties of objects defined by polynomial inequalities. Hilbert's 17th problem and its solution in the first half of the 20th century were landmarks in the early days of the subject. More recently, new connections to the moment problem and to polynomial optimization have been discovered. The moment problem relates linear maps on the multidimensional polynomial ring to positive Borel measures. This book provides an elementary introduction to positive polynomials and sums of squares, the relationship to the moment problem, and the application to polynomial optimization. The focus is on the exciting new developments that have taken place in the last 15 years, arising out of Schmudgen's solution to the moment problem in the compact case in 1991. The book is accessible to a well-motivated student at the beginning graduate level. The objects being dealt with are concrete and down-to-earth, namely polynomials in n variables with real coefficients, and many examples are included. Proofs are presented as clearly and as simply as possible. Various new, simpler proofs appear in the book for the first time. Abstraction is employed only when it serves a useful purpose, but, at the same time, enough abstraction is included to allow the reader easy access to the literature. The book should be essential reading for any beginning student in the area.*

A Mathematician's Lament

How School Cheats Us Out of Our Most Fascinating and Imaginative Art Form

Bellevue Literary Press *"One of the best critiques of current mathematics education I have ever seen."—Keith Devlin, math columnist on NPR's Morning Edition A brilliant research mathematician who has devoted his career to teaching kids reveals math to be creative and beautiful and rejects standard anxiety-producing teaching methods. Witty and accessible, Paul Lockhart's controversial approach will provoke spirited debate among educators and parents alike and it will alter the way we think about math forever. Paul Lockhart, has taught mathematics at Brown University and UC Santa Cruz. Since 2000, he has dedicated himself to K-12 level students at St. Ann's School in Brooklyn, New York.*

Infinite Group Rings

The algebraic study of group rings was initiated in 1949 by I. Kaplansky. The subject has been pursued by a small but growing number of researchers, and has reached a point in its development where a coherent account of the basic results is needed. That is the goal of this text. The topics covered are selective, with material balanced between ring theory and group theory, and a basic one year course in algebra should provide sufficient background for readers.

Computer-Based Testing and the Internet

Issues and Advances

John Wiley & Sons *No topic is more central to innovation and current practice in testing and assessment today than computers and the Internet. This timely publication highlights four main themes that define current issues, technical advances and applications of computer-based testing: Advances in computer-based testing -- new test designs, item selection algorithms, exposure control issues and methods, and new tests that capitalize on the power of computer technology. Operational issues -- systems design, test security, and legal and ethical matters. New and improved uses -- for tests in employment and credentialing. The future of computer-based testing -- identifying potential issues, developments, major advances and problems to overcome. Written by internationally recognized contributors, each chapter focuses on issues of control, quality, security and technology. These issues provide the basic structure for the International Test Commission's new Guidelines on Computer-Based Testing and Testing on the Internet. The contributions to this book have played a key role in the development of these guidelines. Computer-Based Testing and the Internet is a comprehensive guide for all professionals, academics and practitioners working in the fields of education, credentialing, personnel testing and organizational assessment. It will also be of value to students developing expertise in these areas.*

Ideal Systems

An Introduction to Multiplicative Ideal Theory

CRC Press "*Provides for the first time a concise introduction to general and multiplicative ideal theory, valid for commutative rings and monoids and presented in the language of ideal systems on (commutative) monoids.*"

Classroom Assessment

Principles and Practice for Effective Standards-based Instruction

Allyn & Bacon *Classroom Assessment: Principles and Practice for Effective Standards-based Instruction.*

Mathematics and Computation

A Theory Revolutionizing Technology and Science

Princeton University Press *An introduction to computational complexity theory, its connections and interactions with mathematics, and its central role in the natural and social sciences, technology, and philosophy Mathematics and Computation provides a broad, conceptual overview of computational complexity theory—the mathematical study of efficient computation. With important practical applications to computer science and industry, computational complexity theory has evolved into a highly interdisciplinary field, with strong links to most mathematical areas and to a growing number of scientific endeavors. Avi Wigderson takes a sweeping survey of complexity theory, emphasizing the field's insights and challenges. He explains the ideas and motivations leading to key models, notions, and results. In particular, he looks at algorithms and complexity, computations and proofs, randomness and interaction, quantum and arithmetic computation, and cryptography and learning, all as parts of a cohesive whole with numerous cross-influences. Wigderson illustrates the immense breadth of the field, its beauty and richness, and its diverse and growing interactions with other areas of mathematics. He ends with a comprehensive look at the theory of computation, its methodology and aspirations, and the unique and fundamental ways in which it has shaped and will further shape science, technology, and society. For further reading, an extensive bibliography is provided for all topics covered. Mathematics and Computation is useful for undergraduate and graduate students in mathematics, computer science, and related fields, as well as researchers and teachers in these fields. Many parts require little background, and serve as an invitation to newcomers seeking an introduction to the theory of computation. Comprehensive coverage of computational complexity theory, and beyond High-level, intuitive exposition, which brings conceptual clarity to this central and dynamic scientific discipline Historical accounts of the evolution and motivations of central concepts and models A broad view of the theory of computation's influence on science, technology, and society Extensive bibliography*

Math Instruction for Students with Learning Problems

Taylor & Francis *Math Instruction for Students with Learning Problems, Second Edition provides a research-based approach to mathematics instruction designed to build confidence and competence in pre- and in-service PreK–12 teachers. This core textbook addresses teacher and student attitudes toward mathematics, as well as language issues, specific mathematics disabilities, prior experiences, and cognitive and metacognitive factors. The material is rich with opportunities for class activities and field extensions, and the second edition has been fully updated to reference both NCTM and CCSSM standards throughout the text and includes an entirely new chapter on measurement and data analysis.*

Math Makes Sense

7. Practice and homework book

Math from Three to Seven

The Story of a Mathematical Circle for Preschoolers

American Mathematical Soc. *This book is a captivating account of a professional mathematician's experiences conducting a math circle for preschoolers in his apartment in Moscow in the 1980s. As anyone who has taught or raised young children knows, mathematical education for little kids is a real mystery. What are they capable of? What should they learn first? How hard should they work? Should they even "work" at all? Should we push them, or just let them be? There are no correct answers to these questions, and the author deals with them in classic math-circle style: he doesn't ask and then answer a question, but shows us a problem--be it mathematical or pedagogical--and describes to us what happened. His book is a narrative about what he did, what he tried, what worked, what failed, but most important, what the kids experienced. This book does not purport to show you how to create precocious high achievers. It is just one person's story about things he tried with a half-dozen young children. Mathematicians, psychologists, educators, parents, and everybody interested in the intellectual development in young children will find this book to be an invaluable, inspiring resource. In the interest of fostering a greater awareness and appreciation of mathematics and its connections to other disciplines and everyday life, MSRI and the AMS are publishing books in the Mathematical Circles Library series as a service to young people, their parents and teachers, and the mathematics profession. Titles in this series are co-published with the Mathematical Sciences Research Institute (MSRI).*

Stochastic Systems

Theory and Applications

World Scientific *General theory and basic methods of linear and nonlinear stocastic systems (StS), based on the equations for characteristic functions and functionals.Special attention is paid to methods based on canonical expansions and integral canonical represntations.*

The Impact of Pen and Touch Technology on Education

Springer *This book presents perspectives for and by teachers, school and university administrators and educational researchers regarding the great impact pen and tablet technology can have on classrooms and education. presents three distinctly valuable threads of research: Emerging technologies and cutting-edge software invented by researchers and evaluated through real classroom deployments. First-hand perspectives of instructors and administrators who actively implement pen or tablet technologies in their classrooms. Up-and-coming systems that provide insight into the future of pen,*

touch, and sketch recognition technologies in the classrooms and the curriculums of tomorrow. The Impact of Pen and Touch Technology on Education is an essential read for educators who wish get to grips with ink-based computing and bring their teaching methods into the twenty-first century, as well as for researchers in the areas of education, human-computer interaction and intelligent systems for pedagogical advancement.

A Classical Invitation to Algebraic Numbers and Class Fields

Springer "Artin's 1932 Göttingen Lectures on Class Field Theory" and "Connections between Algebrac Number Theory and Integral Matrices"

Global Calculus

American Mathematical Soc. The power that analysis, topology and algebra bring to geometry has revolutionised the way geometers and physicists look at conceptual problems. Some of the key ingredients in this interplay are sheaves, cohomology, Lie groups, connections and differential operators. In Global Calculus, the appropriate formalism for these topics is laid out with numerous examples and applications by one of the experts in differential and algebraic geometry. Ramanan has chosen an uncommon but natural path through the subject. In this almost completely self-contained account, these topics are developed from scratch. The basics of Fourier transforms, Sobolev theory and interior regularity are proved at the same time as symbol calculus, culminating in beautiful results in global analysis, real and complex. Many new perspectives on traditional and modern questions of differential analysis and geometry are the hallmarks of the book. The book is suitable for a first year graduate course on Global Analysis.

Representations and Characters of Finite Groups

Cambridge University Press Representation theory and character theory have proved essential in the study of finite simple groups since their early development by Frobenius. The author begins by presenting the foundations of character theory in a style accessible to advanced undergraduates that requires only a basic knowledge of group theory and general algebra. This theme is then expanded in a self-contained account providing an introduction to the application of character theory to the classification of simple groups. The book follows both strands of the theory: the exceptional characteristics of Suzuki and Feit and the block character theory of Brauer and includes refinements of original proofs that have become available as the subject has grown.

Personalized Learning

A Guide for Engaging Students with Technology

International Society for Technology in Education

Uncertain Projective Geometry

Statistical Reasoning for Polyhedral Object Reconstruction

Springer Science & Business Media Algebraic projective geometry, with its multilinear relations and its embedding into Grassmann-Cayley algebra, has become the basic representation of multiple view geometry, resulting in deep insights into the algebraic structure of geometric relations, as well as in efficient and versatile algorithms for computer vision and image analysis. This book provides a coherent integration of algebraic projective geometry and spatial reasoning under uncertainty with applications in computer vision. Beyond systematically introducing the theoretical foundations from geometry and statistics and clear rules for performing geometric reasoning under uncertainty, the author provides a collection of detailed algorithms. The book addresses researchers and advanced students interested in algebraic projective geometry for image analysis, in statistical representation of objects and transformations, or in generic tools for testing and estimating within the context of geometric multiple-view analysis.

The Learning and Teaching of Algebra

Ideas, Insights and Activities

Routledge IMPACT (Interweaving Mathematics Pedagogy and Content for Teaching) is an exciting new series of texts for teacher education which aims to advance the learning and teaching of mathematics by integrating mathematics content with the broader research and theoretical base of mathematics education. The Learning and Teaching of Algebra provides a pedagogical framework for the teaching and learning of algebra grounded in theory and research. Areas covered include: • Algebra: Setting the Scene • Some Lessons From History • Seeing Algebra Through the Eyes of a Learner • Emphases in Algebra Teaching • Algebra Education in the Digital Era This guide will be essential reading for trainee and qualified teachers of mathematics, graduate students, curriculum developers, researchers and all those who are interested in the "problématique" of teaching and learning algebra. It allows you to get involved in the wealth of knowledge that teachers can draw upon to assist learners, helping you gain the insights that mastering algebra provides.

How Learning Works

Seven Research-Based Principles for Smart Teaching

John Wiley & Sons Praise for How Learning Works "How Learning Works is the perfect title for this excellent book. Drawing upon new research in psychology, education, and cognitive science, the authors have demystified a complex topic into clear explanations of seven powerful learning principles. Full of great ideas and practical suggestions, all based on solid research evidence, this book is essential reading for instructors at all levels who wish to improve their students' learning." —Barbara Gross Davis, assistant vice chancellor for educational development, University of California, Berkeley, and author, Tools for Teaching "This book is a must-read for every instructor, new or experienced. Although I have been teaching for almost thirty years, as I read this book I found myself resonating with many of its ideas, and I discovered new ways of thinking about teaching." —Eugenia T. Paulus, professor of chemistry, North Hennepin Community College, and 2008 U.S. Community Colleges Professor of the Year from The Carnegie Foundation for the Advancement of Teaching and the Council for Advancement and Support of Education "Thank you Carnegie Mellon for making accessible what has previously been inaccessible to those of us who are not learning scientists. Your focus on the essence of learning combined with concrete examples of the daily challenges of teaching and clear tactical strategies for faculty to consider is a welcome work. I will recommend this book to all my colleagues." —Catherine M. Casserly, senior partner, The Carnegie Foundation for the Advancement of Teaching "As you read about each of the seven basic learning principles in this book, you will find advice that is grounded in learning theory, based on research evidence, relevant to college teaching, and easy to understand. The authors have extensive knowledge and experience in applying the science of learning to college teaching, and they graciously share it with you in this organized and readable book." —From the Foreword by Richard E. Mayer, professor of psychology, University of California, Santa Barbara; coauthor, e-Learning and the Science of Instruction; and author, Multimedia Learning

Surgery on Compact Manifolds

American Mathematical Soc. *A new edition of a classic book originally published in 1970 and now updated and expanded to include the very latest developments. The volume remains the single most important book on the topic. Features an attractive cover.*

An Introduction to Symplectic Geometry

American Mathematical Soc. *Symplectic geometry is a central topic of current research in mathematics. Indeed, symplectic methods are key ingredients in the study of dynamical systems, differential equations, algebraic geometry, topology, mathematical physics and representations of Lie groups. This book is a true introduction to symplectic geometry, assuming only a general background in analysis and familiarity with linear algebra. It starts with the basics of the geometry of symplectic vector spaces. Then, symplectic manifolds are defined and explored. In addition to the essential classic results, such as Darboux's theorem, more recent results and ideas are also included here, such as symplectic capacity and pseudoholomorphic curves. These ideas have revolutionized the subject. The main examples of symplectic manifolds are given, including the cotangent bundle, Kahler manifolds, and coadjoint orbits. Further principal ideas are carefully examined, such as Hamiltonian vector fields, the Poisson bracket, and connections with contact manifolds. Berndt describes some of the close connections between symplectic geometry and mathematical physics in the last two chapters of the book. In particular, the moment map is defined and explored, both mathematically and in its relation to physics. He also introduces symplectic reduction, which is an important tool for reducing the number of variables in a physical system and for constructing new symplectic manifolds from old. The final chapter is on quantization, which uses symplectic methods to take classical mechanics to quantum mechanics. This section includes a discussion of the Heisenberg group and the Weil (or metaplectic) representation of the symplectic group. Several appendices provide background material on vector bundles, on cohomology, and on Lie groups and Lie algebras and their representations. Berndt's presentation of symplectic geometry is a clear and concise introduction to the major methods and applications of the subject, and requires only a minimum of prerequisites. This book would be an excellent text for a graduate course or as a source for anyone who wishes to learn about symplectic geometry.*

An Introduction to Measure and Integration

American Mathematical Soc. *Integration is one of the two cornerstones of analysis. Since the fundamental work of Lebesgue, integration has been interpreted in terms of measure theory. This introductory text starts with the historical development of the notion of the integral and a review of the Riemann integral. From here, the reader is naturally led to the consideration of the Lebesgue integral, where abstract integration is developed via measure theory. The important basic topics are all covered: the Fundamental Theorem of Calculus, Fubini's Theorem, L_p spaces, the Radon-Nikodym Theorem, change of variables formulas, and so on. The book is written in an informal style to make the subject matter easily accessible. Concepts are developed with the help of motivating examples, probing questions, and many exercises. It would be suitable as a textbook for an introductory course on the topic or for self-study. For this edition, more exercises and four appendices have been added.*