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Extended Abstracts Spring 2013

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Foundations of Analysis

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A Higher Algebra

ALEXIA ISIAH

Creativity, Giftedness, and Talent Development in Mathematics American Mathematical Soc. Linear chain substances span a large cross section of contemporary chemis try ranging from covalent polymers, organic charge transfer complexes to nonstoichiometric transition metal coordination complexes. Their common ality, which coalesced intense interest in the theoretical and experimental solid-state-physics/chemistry communities, was based on the observation that these inorganic and organic polymeric substrates exhibit striking metal-like electrical and optical properties. Exploitation and extension of these systems has led to the systematic study of both the chemistry and physics of highly and poorly conducting linear chain substances. To gain a salient understanding of these complex materials rich in anomalous anisotropic electrical, optical, magnetic, and mechanical properties, the convergence of diverse skills and talents was required. The constructive blending of traditionally segregated disciplines such as synthetic and physical organic, inorganic, and polymer chemistry, crystallography, and theoretical and experimental solid state physics has led to the timely devel opment of a truly interdisciplinary science. This is evidenced in the contri butions of this monograph series. Within the theme of Extended Linear Chain Compounds, experts in important, but varied, facets of the discipline have reflected upon the progress that has been made and have cogently summarized their field of specialty. Consequently, up-to-date reviews of numerous and varied aspects of "extended linear chain compounds" has developed. Within these volumes, numerous incisive contributions covering all aspects of the diverse linear chain substances have been summarized. I am confident that assimilation of the state-of-the-art and clairvoy ance will be rewarded with extraordinary developments in the near future.

Precalculus IAP

An antidote to mathematical rigor mortis, teaching how to guess answers without needing a proof or an exact calculation. In problem solving, as in street fighting, rules are for fools: do whatever works—don't just stand there! Yet we often fear an unjustified leap even though it may land us on a correct result. Traditional mathematics teaching is largely about solving exactly stated problems exactly, yet life often hands us partly defined problems needing only moderately accurate solutions. This engaging book is an antidote to the rigor mortis brought on by too much mathematical rigor, teaching us how to guess answers without needing a proof or an exact calculation. In *Street-Fighting Mathematics*, Sanjoy Mahajan builds, sharpens, and demonstrates tools for educated guessing and down-and-dirty, opportunistic problem solving across diverse fields of knowledge—from mathematics to management. Mahajan describes six tools: dimensional analysis, easy cases, lumping, picture proofs, successive approximation, and reasoning by analogy. Illustrating each tool with numerous examples, he carefully separates the tool—the general principle—from the particular application so that the reader can most easily grasp the tool itself to use on problems of particular

interest. *Street-Fighting Mathematics* grew out of a short course taught by the author at MIT for students ranging from first-year undergraduates to graduate students ready for careers in physics, mathematics, management, electrical engineering, computer science, and biology. They benefited from an approach that avoided rigor and taught them how to use mathematics to solve real problems. *Street-Fighting Mathematics* will appear in print and online under a Creative Commons Noncommercial Share Alike license.

A Book of Abstract Algebra American Mathematical Soc.

In the American Mathematical Society's first-ever book for kids (and kids at heart), mathematician and author Richard Evan Schwartz leads math lovers of all ages on an innovative and strikingly illustrated journey through the infinite number system. By means of engaging, imaginative visuals and endearing narration, Schwartz manages the monumental task of presenting the complex concept of Big Numbers in fresh and relatable ways. The book begins with small, easily observable numbers before building up to truly gigantic ones, like a nonillion, a tredecillion, a googol, and even ones too huge for names! Any person, regardless of age, can benefit from reading this book. Readers will find themselves returning to its pages for a very long time, perpetually learning from and growing with the narrative as their knowledge deepens. *Really Big Numbers* is a wonderful enrichment for any math education program and is enthusiastically recommended to every teacher, parent and grandparent, student, child, or other individual interested in exploring the vast universe of numbers.

First Course in Algebra American Mathematical Soc.

"The text is suitable for a typical introductory algebra course, and was developed to be used flexibly. While the breadth of topics may go beyond what an instructor would cover, the modular approach and the richness of content ensures that the book meets the needs of a variety of programs."--Page 1.

The Texas Mathematics Teachers' Bulletin Springer Science & Business Media

An authorised reissue of the long out of print classic textbook, *Advanced Calculus* by the late Dr Lynn Loomis and Dr Shlomo Sternberg both of Harvard University has been a revered but hard to find textbook for the advanced calculus course for decades. This book is based on an honors course in advanced calculus that the authors gave in the 1960's. The foundational material, presented in the unstarred sections of Chapters 1 through 11, was normally covered, but different applications of this basic material were stressed from year to year, and the book therefore contains more material than was covered in any one year. It can accordingly be used (with omissions) as a text for a year's course in advanced calculus, or as a text for a three-semester introduction to analysis. The prerequisites are a good grounding in the calculus of one variable from a mathematically rigorous point of view, together with some acquaintance with linear algebra. The reader should be familiar with limit and continuity type arguments and have a certain amount of mathematical sophistication. As possible introductory texts, we mention *Differential and Integral Calculus* by R Courant, *Calculus* by T Apostol, *Calculus* by M Spivak, and *Pure Mathematics* by G Hardy. The reader should also have

some experience with partial derivatives. In overall plan the book divides roughly into a first half which develops the calculus (principally the differential calculus) in the setting of normed vector spaces, and a second half which deals with the calculus of differentiable manifolds.

Plane geometry Routledge

Exploring how new concepts are entered into our systems along with sufficient continuity with older ideas to ensure understanding, this text highlights the different aspects that present an insightful view into the various theories of concepts.

Street-Fighting Mathematics Springer Science & Business Media

Accessible but rigorous, this outstanding text encompasses all of the topics covered by a typical course in elementary abstract algebra. Its easy-to-read treatment offers an intuitive approach, featuring informal discussions followed by thematically arranged exercises. This second edition features additional exercises to improve student familiarity with applications. 1990 edition.

MathLinks 9 John Wiley & Sons

Our innovative spirit and creativity lies beneath the comforts and security of today's technologically evolved society. Scientists, inventors, investors, artists and leaders play a vital role in the advancement and transmission of knowledge. Mathematics, in particular, plays a central role in numerous professions and has historically served as the gatekeeper to numerous other areas of study, particularly the hard sciences, engineering and business. Mathematics is also a major component in standardized tests in the U.S., and in university entrance exams in numerous parts of world. Creativity and imagination is often evident when young children begin to develop numeric and spatial concepts, and explore mathematical tasks that capture their interest. Creativity is also an essential ingredient in the work of professional mathematicians. Yet, the bulk of mathematical thinking encouraged in the institutionalized setting of schools is focused on rote learning, memorization, and the mastery of numerous skills to solve specific problems prescribed by the curricula or aimed at standardized testing. Given the lack of research based perspectives on talent development in mathematics education, this monograph is specifically focused on contributions towards the constructs of creativity and giftedness in mathematics. This monograph presents new perspectives for talent development in the mathematics classroom and gives insights into the psychology of creativity and giftedness. The book is aimed at classroom teachers, coordinators of gifted programs, math contest coaches, graduate students and researchers interested in creativity, giftedness, and talent development in mathematics.

The Functional Calculus for Sectorial Operators Springer Science & Business Media

The two parts of this volume feature seventeen and six extended conference abstracts corresponding to selected talks given by participants at "Joint CRM-Imperial College Workshop in Complex Systems" and "Emergence, Spread and Control of Infectious Diseases" respectively, both held at the Centre de Recerca Matemàtica in Barcelona in spring 2013. Most of them are short articles giving preliminary presentations of new results not yet published in regular research journals. The articles are the result from a direct collaboration among active researchers in the area after working in a dynamic and productive atmosphere. Almost everything that is interesting and important for society is complex; here, examples scattered across science are presented in order to illustrate the cross-disciplinary richness of state-of-the-art complex systems research: fracture

avalanches and rain showers that mimic earthquakes; highly organized graphs that account for processes in neural networks, metabolic networks, food webs, or language; models for DNA dynamics; or statistical methods to test complexity in the form of structure along many different scales. The mathematics is put to work for the modeling of the real system, and the models are kept at a minimum level to allow the understanding of the essentials of the real system. The book is intended for established researchers, as well as for PhD and postdoc students who wish to learn more about the latest advances in these active areas of research.

Helping Children Learn Mathematics Tabletop Academy Press

Designed to help pre-service and in-service teachers gain the knowledge they need to facilitate students' understanding, competency, and interest in mathematics, the revised and updated Second Edition of this popular text and resource bridges the gap between the mathematics learned in college and the mathematics taught in secondary schools. Highlighting multiple types of mathematical understanding to deepen insight into the secondary school mathematics curriculum, it addresses typical areas of difficulty and common student misconceptions so teachers can involve their students in learning mathematics in a way that is interesting, interconnected, understandable, and often surprising and entertaining. Six content strands are discussed—Numbers and Operations; Algebra; Geometry; Measurement; Data Analysis and Probability; and Proof, Functions, and Mathematical Modeling. The informal, clear style supports an interactive learner-centered approach through engaging pedagogical features: Launch Questions at the beginning of each section capture interest and involve readers in learning the mathematical concepts. Practice Problems provide opportunities to apply what has been learned and complete proofs. Questions from the Classroom bring the content to life by addressing the deep "why" conceptual questions that middle or secondary school students are curious about, and questions that require analysis and correction of typical student errors and misconceptions; focus on counter intuitive results; and contain activities and/or tasks suitable for use with students. Changes in the Second Edition New sections on Robotics, Calculators, Matrix Operations, Cryptography, and the Coefficient of Determination New problems, simpler proofs, and more illustrative examples Answers and hints for selected problems provided *Mathematics Standard Level for IB Diploma Exam Preparation Guide* MIT Press

A groundbreaking introduction to vectors, matrices, and least squares for engineering applications, offering a wealth of practical examples.

Mathematics as an Educational Task Black Dog & Leventhal

"Precalculus is intended for college-level precalculus students. Since precalculus courses vary from one institution to the next, we have attempted to meet the needs of as broad an audience as possible, including all of the content that might be covered in any particular course. The result is a comprehensive book that covers more ground than an instructor could likely cover in a typical one- or two-semester course; but instructors should find, almost without fail, that the topics they wish to include in their syllabus are covered in the text. Many chapters of OpenStax College Precalculus are suitable for other freshman and sophomore math courses such as College Algebra and Trigonometry; however, instructors of those courses might need to supplement or adjust the material. OpenStax will also be releasing College Algebra and Algebra and trigonometry titles tailored to the particular scope, sequence, and pedagogy of those courses."--Preface.

Eureka Math Algebra II Study Guide Ratna Sagar

A hilarious reeducation in mathematics—full of joy, jokes, and stick figures—that sheds light on the countless practical and wonderful ways that math structures and shapes our world. In *Math With Bad Drawings*, Ben Orlin reveals to us what math actually is; its myriad uses, its strange symbols, and the wild leaps of logic and faith that define the usually impenetrable work of the mathematician. Truth and knowledge come in multiple forms: colorful drawings, encouraging jokes, and the stories and insights of an empathetic teacher who believes that math should belong to everyone. Orlin shows us how to think like a mathematician by teaching us a brand-new game of tic-tac-toe, how to understand an economic crisis by rolling a pair of dice, and the mathematical headache that ensues when attempting to build a spherical Death Star. Every discussion in the book is illustrated with Orlin's trademark "bad drawings," which convey his message and insights with perfect pitch and clarity. With 24 chapters covering topics from the electoral college to human genetics to the reasons not to trust statistics, *Math with Bad Drawings* is a life-changing book for the math-estranged and math-enamored alike.

Fundamentals of Mathematics Cambridge University Press

College Algebra provides a comprehensive exploration of algebraic principles and meets scope and sequence requirements for a typical introductory algebra course. The modular approach and richness of content ensure that the book meets the needs of a variety of courses. *College Algebra* offers a wealth of examples with detailed, conceptual explanations, building a strong foundation in the material before asking students to apply what they've learned. Coverage and Scope In determining the concepts, skills, and topics to cover, we engaged dozens of highly experienced instructors with a range of student audiences. The resulting scope and sequence proceeds logically while allowing for a significant amount of flexibility in instruction. Chapters 1 and 2 provide both a review and foundation for study of Functions that begins in Chapter 3. The authors recognize that while some institutions may find this material a prerequisite, other institutions have told us that they have a cohort that need the prerequisite skills built into the course. Chapter 1: Prerequisites Chapter 2: Equations and Inequalities Chapters 3-6: The Algebraic Functions Chapter 3: Functions Chapter 4: Linear Functions Chapter 5: Polynomial and Rational Functions Chapter 6: Exponential and Logarithm Functions Chapters 7-9: Further Study in College Algebra Chapter 7: Systems of Equations and Inequalities Chapter 8: Analytic Geometry Chapter 9: Sequences, Probability and Counting Theory

Let's Play Math Springer

This book contains a systematic and partly axiomatic treatment of the holomorphic functional calculus for unbounded sectorial operators. The account is generic so that it can be used to construct and interrelate holomorphic functional calculi for other types of unbounded operators. Particularly, an elegant unified approach to holomorphic semigroups is obtained. The last chapter describes applications to PDE, evolution equations and approximation theory as well as the connection with harmonic analysis.

Extended Linear Chain Compounds Routledge

This is the last of three volumes that, together, give an exposition of the mathematics of grades 9–12 that is simultaneously mathematically correct and grade-level appropriate. The volumes are consistent with CCSSM (Common Core State Standards for Mathematics) and aim at presenting the mathematics of K–12 as a totally transparent subject. This volume distinguishes itself from others of the same genre in getting the mathematics right. In trigonometry, this volume makes explicit the fact that the trigonometric functions cannot even be defined without the theory of similar triangles. It also provides details for extending the domain of definition of sine and cosine to all real numbers. It explains as well why radians should be used for angle measurements and gives a proof of the conversion formulas between degrees and radians. In calculus, this volume pares the technicalities concerning limits down to the essential minimum to make the proofs of basic facts about differentiation and integration both correct and accessible to school teachers and educators; the exposition may also benefit beginning math majors who are learning to write proofs. An added bonus is a correct proof that one can get a repeating decimal equal to a given fraction by the “long division” of the numerator by the denominator. This proof attends to all three things all at once: what an infinite decimal is, why it is equal to the fraction, and how long division enters the picture. This book should be useful for current and future teachers of K–12 mathematics, as well as for some high school students and for education professionals.

New Mathematics Today Class 7 Elsevier

Foundations of Analysis has two main goals. The first is to develop in students the mathematical maturity and sophistication they will need as they move through the upper division curriculum. The second is to present a rigorous development of both single and several variable calculus, beginning with a study of the properties of the real number system. The presentation is both thorough and concise, with simple, straightforward explanations. The exercises differ widely in level of abstraction and level of difficulty. They vary from the simple to the quite difficult and from the computational to the theoretical. Each section contains a number of examples designed to illustrate the material in the section and to teach students how to approach the exercises for that section. --Book cover.

Really Big Numbers John Wiley & Sons

New Mathematics Today, a thoroughly revised series for KG to Class 8, has been designed as per the requirements of the latest curriculum. The content of this series is designed to reach all learners in the classroom irrespective of their skill levels or learning capabilities.

Advanced Calculus (Revised Edition) World Scientific Publishing Company

These books are based on the latest NCERT syllabus. The language, terminology and the symbols used are student-friendly and easily understandable by the students. Ample emphasis has been given to explain various mathematical concepts correctly and with detailed explanations. All important results and formulae of each chapter have been provided at the end of each chapter for the convenience of students.

Conceptual Systems National Academies Press

A brilliant introduction to the pleasures of mathematical thinking, this book attempts to convey to general readers the feeling of eureka—the joy of discovery—that mathematicians feel when they first encounter an elegant truth. 92 line illustrations.