Mathematics N4 April 2011 Memo

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Software Abstractions, revised edition - Daniel Jackson 2016-02-12
An approach to software design that introduces a fully automated analysis giving designers immediate feedback, now featuring the latest version of the Alloy language. In Software Abstractions Daniel Jackson introduces an approach to software design that draws on traditional formal methods but exploits automated tools to find flaws as early as possible. This approach—which Jackson calls "lightweight formal methods" or "agile modeling"—takes from formal specification the idea of a precise and expressive notation based on a tiny core of simple and robust concepts but replaces conventional analysis based on theorem proving with a fully automated analysis that gives designers immediate feedback. Jackson has developed Alloy, a language that captures the essence of software abstractions simply and succinctly, using a minimal toolkit of mathematical notions. This revised edition updates the text, examples, and appendixes to be fully compatible with Alloy 4.

Knowledge Graphs - Aidan Hogan 2021-11-08
This book provides a comprehensive and accessible introduction to knowledge graphs, which have recently garnered notable attention from both industry and academia. Knowledge graphs are founded on the principle of applying a graph-based abstraction to data, and are now broadly deployed in scenarios that require integrating and extracting value from multiple, diverse sources of data at large scale. The book defines knowledge graphs and provides a high-level overview of how they are used. It presents and contrasts popular graph models that are commonly used to represent data as graphs, and the languages by which they can be queried before describing how the resulting data graph can be enhanced with notions of schema, identity, and context. The book discusses how ontologies and rules can be used to encode knowledge as well as how inductive techniques—based on statistics, graph analytics, machine learning, etc.—can be used to encode and extract knowledge. It covers techniques for the creation, enrichment, assessment, and refinement of knowledge graphs and surveys recent open and enterprise knowledge graphs and the industries or applications within which they have been most widely adopted. The book closes by discussing the current limitations and future directions along which knowledge graphs are likely to evolve. This book is aimed at students, researchers, and practitioners who wish to learn more about knowledge graphs and how they facilitate extracting value from diverse data at large scale. To make the book accessible for newcomers, running examples and graphical notation are used throughout. Formal definitions and extensive references are also provided for those who opt to delve more deeply into specific topics.

Information Theory, Inference and Learning Algorithms - David J. C. MacKay 2003-09-25
Table of contents
Reading, Writing, and Proving - Ulrich Daepp 2006-04-18
This book, based on Pólya's method of problem solving, aids students in their transition to higher-level mathematics. It begins by providing

a great deal of guidance on how to approach definitions, examples, and theorems in mathematics and ends by providing projects for independent study. Students will follow Pólya's four step process: learn to understand the problem; devise a plan to solve the problem; carry out that plan; and look back and check what the results told them.

Semilinear Schrodinger Equations - Thierry Cazenave 2003
The nonlinear Schrodinger equation has received a great deal of attention from mathematicians, in particular because of its applications to nonlinear optics. It is also a good model dispersive equation, since it is often technically simpler than other dispersive equations, such as the wave or Korteweg-de Vries equation. Particularly useful tools in studying the nonlinear Schrodinger equation are energy and Strichartz's estimates. This book presents various mathematical aspects of the nonlinear Schrodinger equation. It examines both problems of local nature (local existence of solutions, uniqueness, regularity, smoothing effects) and problems of global nature (finite-time blowup, global existence, asymptotic behavior of solutions). The methods presented apply in principle to a large class of dispersive semilinear equations. Basic notions of functional analysis (Fourier transform, Sobolev spaces, etc.) are recalled in the first chapter, but the book is otherwise mostly self-contained.

On the Stability of Type I Blow Up for the Energy Super Critical Heat Equation - Charles Collot 2019-09-05
The authors consider the energy super critical semilinear heat equation The authors first revisit the construction of radially symmetric self similar solutions performed through an ode approach and propose a bifurcation type argument which allows for a sharp control of the spectrum of the corresponding linearized operator in suitable weighted spaces. They then show how the sole knowledge of this spectral gap in weighted spaces implies the finite codimensional nonradial stability of these solutions for smooth well localized initial data using energy bounds. The whole scheme draws a route map for the derivation of the existence and stability of self-similar blow up in nonradial energy super critical settings.

Distribution of Resonances in Scattering by Thin Barriers - Jeffrey Galkowski 2019-06-10
The author studies high energy resonances for the operators where is strictly convex with smooth boundary, may depend on frequency, and is the surface measure on .

Morse-Bott Approach to Monopole Floer Homology and the Triangulation Conjecture - Francesco Lin 2018
In the present work we generalize the construction of monopole Floer homology due to Kronheimer and Mrowka to the case of a gradient flow with Morse-Bott singularities. Focusing then on the special case of a three-manifold equipped equipped with a spin[superscript]c structure which is isomorphic to its conjugate, we define the counterpart in this context of Manolescu's recent Pin(2)-equivariant Seiberg-Witten-Floer homology. In particular, we provide an alternative approach to his disproof of the celebrated Triangulation conjecture.

Measure Theory and Fine Properties of Functions - LawrenceCraig Evans 2018-04-27
This book provides a detailed examination of the central assertions of measure theory in n-dimensional Euclidean space and emphasizes the roles of Hausdorff measure and the capacity in characterizing the fine properties of sets and functions. Topics covered include a quick review of abstract measure theory, theorems and differentiation in Mn, lower Hausdorff measures, area and coarea formulas for Lipschitz mappings and related change-of-variable formulas, and Sobolev functions and functions of bounded variation. The text provides complete proofs of many key results omitted from other books, including Besicovitch's Covering Theorem, Rademacher's Theorem (on the differentiability a.e. of Lipschitz functions), the Area and Coarea Formulas, the precise structure of Sobolev and BV functions, the precise structure of sets of finite perimeter, and Alexandro's Theorem (on the twice differentiability a.e. of convex functions). Topics are carefully selected and the proofs succinct, but complete, which makes this book ideal reading for applied mathematicians and graduate students in applied mathematics.

Group Theory - Predrag Cvitanović 2020-05-26
If classical Lie groups preserve bilinear vector norms, what Lie groups preserve trilinear,

quadrilinear, and higher order invariants? Answering this question from a fresh and original perspective, Predrag Cvitanovic takes the reader on the amazing, four-thousand-diagram journey through the theory of Lie groups. This book is the first to systematically develop, explain, and apply diagrammatic projection operators to construct all semi-simple Lie algebras, both classical and exceptional. The invariant tensors are presented in a somewhat unconventional, but in recent years widely used, "birdtracks" notation inspired by the Feynman diagrams of quantum field theory. Notably, invariant tensor diagrams replace algebraic reasoning in carrying out all group-theoretic computations. The diagrammatic approach is particularly effective in evaluating complicated coefficients and group weights, and revealing symmetries hidden by conventional algebraic or index notations. The book covers most topics needed in applications from this new perspective: permutations, Young projection operators, spinorial representations, Casimir operators, and Dynkin indices. Beyond this well-traveled territory, more exotic vistas open up, such as "negative dimensional" relations between various groups and their representations. The most intriguing result of classifying primitive invariants is the emergence of all exceptional Lie groups in a single family, and the attendant pattern of exceptional and classical Lie groups, the so-called Magic Triangle. Written in a lively and personable style, the book is aimed at researchers and graduate students in theoretical physics and mathematics.

The Algorithm Design Manual - Steven S Skiena 2009-04-05
This newly expanded and updated second edition of the best-selling classic continues to take the "mystery" out of designing algorithms, and analyzing their efficacy and efficiency. Expanding on the first edition, the book now serves as the primary textbook of choice for algorithm design courses while maintaining its status as the premier practical reference guide to algorithms for programmers, researchers, and students. The reader-friendly Algorithm Design Manual provides straightforward access to combinatorial algorithms technology, stressing design over analysis. The first part, Techniques, provides accessible instruction on methods for designing and analyzing computer algorithms. The second part, Resources, is intended for browsing and reference, and comprises the catalog of algorithmic resources, implementations and an extensive bibliography. NEW to the second edition: • Doubles the tutorial material and exercises over the first edition • Provides full online support for lecturers, and a completely updated and improved website component with lecture slides, audio and video • Contains a unique catalog identifying the 75 algorithmic problems that arise most often in practice, leading the reader down the right path to solve them • Includes several NEW "war stories" relating experiences from real-world applications • Provides up-to-date links leading to the very best algorithm implementations available in C, C++, and Java

Galois and Cleft Monoidal Cowreaths. Applications - D. Bulacu 2021-07-21
We introduce (pre-)Galois and cleft monoidal cowreaths. Generalizing a result of Schneider, to any pre-Galois cowreath we associate a pair of adjoint functors L R and give necessary and sufficient conditions for the adjunction to be an equivalence of categories. Inspired by the work of Doi we also give sufficient conditions for L R to be an equivalence, and consequently conditions under which a fundamental structure theorem for entwined modules over monoidal cowreaths holds. We show that a cowreath is cleft if and only if it is Galois and has the normal basis property; this generalizes a result concerning Hopf cleft extensions due to Doi and Takeuchi. Furthermore, we show that the cleft cowreaths are in a one to one correspondence with what we call cleft wreaths. The latter are wreaths in the sense of Lack and Street, equipped with two additional morphisms satisfying some compatibility relations. Note that, in general, the algebras defined by cleft wreaths cannot be identified to (generalized) crossed product algebras, as they were defined by Doi and Takeuchi, and Blattner, Cohen and Montgomery. This becomes more transparent when we apply our theory to cowreaths defined by actions and coactions of a quasi-Hopf algebra, monoidal entwining structures and ν-Doi-Hopf structures, respectively. In particular, we obtain that some constructions of Brzezi´nski and

Schauenburg produce examples of cleft wreaths, and therefore of cleft cowreaths, too.

Engineering a Compiler - Keith Cooper 2011-01-18
This entirely revised second edition of Engineering a Compiler is full of technical updates and new material covering the latest developments in compiler technology. In this comprehensive text you will learn important techniques for constructing a modern compiler. Leading educators and researchers Keith Cooper and Linda Torczon combine basic principles with pragmatic insights from their experience building state-of-the-art compilers. They will help you fully understand important techniques such as compilation of imperative and object-oriented languages, construction of static single assignment forms, instruction scheduling, and graph-coloring register allocation. In-depth treatment of algorithms and techniques used in the front end of a modern compiler Focus on code optimization and code generation, the primary areas of recent research and development Improvements in presentation including conceptual overviews for each chapter, summaries and review questions for sections, and prominent placement of definitions for new terms Examples drawn from several different programming languages

Spectral Invariants with Bulk, Quasi-Morphisms and Lagrangian Floer Theory - Kenji Fukaya 2019-09-05
In this paper the authors first develop various enhancements of the theory of spectral invariants of Hamiltonian Floer homology and of Entov-Polterovich theory of spectral symplectic quasi-states and quasi-morphisms by incorporating bulk deformations, i.e., deformations by ambient cycles of symplectic manifolds, of the Floer homology and quantum cohomology. Essentially the same kind of construction is independently carried out by Usher in a slightly less general context. Then the authors explore various applications of these enhancements to the symplectic topology, especially new construction of symplectic quasi-states, quasi-morphisms and new Lagrangian intersection results on toric and non-toric manifolds. The most novel part of this paper is its use of open-closed Gromov-Witten-Floer theory and its variant involving closed orbits of periodic Hamiltonian system to connect spectral invariants (with bulk deformation), symplectic quasi-states, quasi-morphism to the Lagrangian Floer theory (with bulk deformation). The authors use this open-closed Gromov-Witten-Floer theory to produce new examples. Using the calculation of Lagrangian Floer cohomology with bulk, they produce examples of compact symplectic manifolds which admits uncountably many independent quasi-morphisms . They also obtain a new intersection result for the Lagrangian submanifold in .

Dimensions of Affine Deligne–Lusztig Varieties: A New Approach Via Labeled Folded Alcove Walks and Root Operators - Elizabeth Milićević 2019-12-02
Let G be a reductive group over the field F=k((t)), where k is an algebraic closure of a finite field, and let W be the (extended) affine Weyl group of G. The associated affine Deligne–Lusztig varieties Xx(b), which are indexed by elements b∈G(F) and x∈W, were introduced by Rapoport. Basic questions about the varieties Xx(b) which have remained largely open include when they are nonempty, and if nonempty, their dimension. The authors use techniques inspired by geometric group theory and combinatorial representation theory to address these questions in the case that b is a pure translation, and so prove much of a sharpened version of a conjecture of Görtz, Haines, Kottwitz, and Reuman. The authors' approach is constructive and type-free, sheds new light on the reasons for existing results in the case that b is basic, and reveals new patterns. Since they work only in the standard apartment of the building for G(F), their results also hold in the p-adic context, where they formulate a definition of the dimension of a p-adic Deligne–Lusztig set. The authors present two immediate applications of their main results, to class polynomials of affine Hecke algebras and to affine reflection length.

CUDA Application Design and Development - Rob Farber 2011-10-31
The book then details the thought behind CUDA and teaches how to create, analyze, and debug CUDA applications. Throughout, the focus is on software engineering issues: how to use CUDA in the context of existing application code, with existing compilers, languages, software tools,

and industry-standard API libraries."--Pub. desc.

Invariant Manifolds and Dispersive Hamiltonian Evolution Equations - Kenji Nakanishi 2011

The notion of an invariant manifold arises naturally in the asymptotic stability analysis of stationary or standing wave solutions of unstable dispersive Hamiltonian evolution equations such as the focusing semilinear Klein-Gordon and Schrodinger equations. This is due to the fact that the linearized operators about such special solutions typically exhibit negative eigenvalues (a single one for the ground state), which lead to exponential instability of the linearized flow and allows for ideas from hyperbolic dynamics to enter. One of the main results proved here for energy subcritical equations is that the center-stable manifold associated with the ground state appears as a hyper-surface which separates a region of finite-time blowup in forward time from one which exhibits global existence and scattering to zero in forward time. The authors' entire analysis takes place in the energy topology, and the conserved energy can exceed the ground state energy only by a small amount. This monograph is based on recent research by the authors. The proofs rely on an interplay between the variational structure of the ground states and the nonlinear hyperbolic dynamics near these states. A key element in the proof is a virial-type argument excluding almost homoclinic orbits originating near the ground states, and returning to them, possibly after a long excursion. These lectures are suitable for graduate students and researchers in partial differential equations and mathematical physics. For the cubic Klein-Gordon equation in three dimensions all details are provided, including the derivation of Strichartz estimates for the free equation and the concentration-compactness argument leading to scattering due to Kenig and Merle.

Handbook of Mathematical Geosciences - B.S. Daya Sagar 2018-06-25

This Open Access handbook published at the IAMG's 50th anniversary, presents a compilation of invited path-breaking research contributions by award-winning geoscientists who have been instrumental in shaping the IAMG. It contains 45 chapters that are categorized broadly into five parts (i) theory, (ii) general applications, (iii) exploration and resource estimation, (iv) reviews, and (v) reminiscences covering related topics like mathematical geosciences, mathematical morphology, geostatistics, fractals and multifractals, spatial statistics, multipoint geostatistics, compositional data analysis, informatics, geocomputation, numerical methods, and chaos theory in the geosciences.

Variations on a Theorem of Tate - Stefan Patrikis 2019-04-10

Let F be a number field. These notes explore Galois-theoretic, automorphic, and motivic analogues and refinements of Tate's basic result that continuous projective representations $Gal(\bar{F}/F) \rightarrow PGLn(C)$ lift to $GLn(C)$. The author takes special interest in the interaction of this result with algebraicity (for automorphic representations) and geometricity (in the sense of Fontaine-Mazur). On the motivic side, the author studies refinements and generalizations of the classical Kuga-Satake construction. Some auxiliary results touch on: possible infinity-types of algebraic automorphic representations; comparison of the automorphic and Galois "Tannakian formalisms" monodromy (independence-of-ℓ) questions for abstract Galois representations.

Floer Homology Groups in Yang-Mills Theory - S. K. Donaldson 2002-01-10

The concept of Floer homology was one of the most striking developments in differential geometry. It yields rigorously defined invariants which can be viewed as homology groups of infinite-dimensional cycles. The ideas led to great advances in the areas of low-dimensional topology and symplectic geometry and are intimately related to developments in Quantum Field Theory. The first half of this book gives a thorough account of Floer's construction in the context of gauge theory over 3 and 4-dimensional manifolds. The second half works out some further technical developments of the theory, and the final chapter outlines some research developments for the future - including a discussion of the appearance of modular forms in the theory. The scope of the material in this book means that it will appeal to graduate students as well as those on the frontiers of the subject.

The Triangle-Free Process and the Ramsey Number R(3,k) - Gonzalo Fiz Pontiveros

2020-04-03
The areas of Ramsey theory and random graphs have been closely linked ever since Erdős's famous proof in 1947 that the "diagonal" Ramsey numbers R(k) grow exponentially in k. In the early 1990s, the triangle-free process was introduced as a model which might potentially provide good lower bounds for the "off-diagonal" Ramsey numbers R(3,k). In this model, edges of Kn are introduced one-by-one at random and added to the graph if they do not create a triangle; the resulting final (random) graph is denoted $G_{n,\triangle}$. In 2009, Bohman succeeded in following this process for a positive fraction of its duration, and thus obtained a second proof of Kim's celebrated result that $R(3,k)=\Theta(k^2/\log k)$. In this paper the authors improve the results of both Bohman and Kim and follow the triangle-free process all the way to its asymptotic end.

Fault Tree Handbook - W. E. Vesely 1981
Developed to serve as a text for the System Safety and Reliability Analysis course presented to Nuclear Regulatory Commission personnel and contractors. Codifies and systematizes the fault tree approach, a deductive failure analysis which focuses on one particular undesired event and provides a method for determining the causes of that event.

Computer Vision - Richard Szeliski 2010-09-30
Computer Vision: Algorithms and Applications explores the variety of techniques commonly used to analyze and interpret images. It also describes challenging real-world applications where vision is being successfully used, both for specialized applications such as medical imaging, and for fun, consumer-level tasks such as image editing and stitching, which students can apply to their own personal photos and videos. More than just a source of "recipes," this exceptionally authoritative and comprehensive textbook/reference also takes a scientific approach to basic vision problems, formulating physical models of the imaging process before inverting them to produce descriptions of a scene. These problems are also analyzed using statistical models and solved using rigorous engineering techniques. Topics and features: structured to support active curricula and project-oriented courses, with tips in the Introduction for using the book in a variety of customized courses; presents exercises at the end of each chapter with a heavy emphasis on testing algorithms and containing numerous suggestions for small mid-term projects; provides additional material and more detailed mathematical topics in the Appendices, which cover linear algebra, numerical techniques, and Bayesian estimation theory; suggests additional reading at the end of each chapter, including the latest research in each sub-field, in addition to a full Bibliography at the end of the book; supplies supplementary course material for students at the associated website, http://szeliski.org/Book/. Suitable for an upper-level undergraduate or graduate-level course in computer science or engineering, this textbook focuses on basic techniques that work under real-world conditions and encourages students to push their creative boundaries. Its design and exposition also make it eminently suitable as a unique reference to the fundamental techniques and current research literature in computer vision.

Geometry of Sets and Measures in Euclidean Spaces - Pertti Mattila 1999-02-25
This book studies the geometric properties of general sets and measures in euclidean space.

Good Strategy/Bad Strategy - Richard Rumelt 2011-06-09
When Richard Rumelt's Good Strategy/Bad Strategy was published in 2011, it immediately struck a chord, calling out as bad strategy the mish-mash of pop culture, motivational slogans and business buzz speak so often and misleadingly masquerading as the real thing. Since then, his original and pragmatic ideas have won fans around the world and continue to help readers to recognise and avoid the elements of bad strategy and adopt good, action-oriented strategies that honestly acknowledge the challenges being faced and offer straightforward approaches to overcoming them. Strategy should not be equated with ambition, leadership, vision or planning; rather, it is coherent action backed by an argument. For Rumelt, the heart of good strategy is insight into the hidden power in any situation, and into an appropriate response - whether launching a new product, fighting a war or putting a man on the moon. Drawing on examples of the good and the bad from across all sectors and all ages, he shows how this insight can be cultivated with a

wide variety of tools that lead to better thinking and better strategy, strategy that cuts through the hype and gets results.

Applied Thematic Analysis - Greg Guest 2012 This book provides step-by-step instructions on how to analyze text generated from in-depth interviews and focus groups, relating predominantly to applied qualitative studies. The book covers all aspects of the qualitative data analysis process, employing a phenomenological approach which has a primary aim of describing the experiences and perceptions of research participants. Similar to Grounded Theory, the authors' approach is inductive, content-driven, and searches for themes within textual data. Law of Delict - J. Neethling 1994

Study and Master Mathematical Literacy Grade 12 CAPS Learner's Book - Karen Morrison 2014-05-01

Motivating Students Who Don't Care - Allen Mendler 2009-05-01 This book is a comprehensive and practical guide for reconnecting with discouraged students and reawakening their excitement and enthusiasm for learning. With proven strategies from the classroom, Dr. Mendler identifies five effective processes you can use to reawaken motivation in students who aren't prepared, don't care, and won't work. These processes include emphasizing effort, creating hope, respecting power, building relationships, and expressing enthusiasm.

Witten Non Abelian Localization for Equivariant K-theory, and the [Q,R]=0 Theorem - Paul-Emile Paradan 2019-12-02 The purpose of the present memoir is two-fold. First, the authors obtain a non-abelian localization theorem when M is any even dimensional compact manifold : following an idea of E. Witten, the authors deform an elliptic symbol associated to a Clifford bundle on M with a vector field associated to a moment map. Second, the authors use this general approach to reprove the [Q,R]=0 [Q,R]=0 theorem of Meinrenken-Sjamaar in the Hamiltonian case and obtain mild generalizations to almost complex manifolds. This non-abelian localization theorem can be used to obtain a geometric description of the multiplicities of the index of

general spin c spinc Dirac operators.

Probability, Statistics, and Stochastic Processes - Peter Olofsson 2012-05-22 Praise for the First Edition ". . . an excellent textbook . . . well organized and neatly written." —Mathematical Reviews ". . . amazingly interesting . . ." —Technometrics Thoroughly updated to showcase the interrelationships between probability, statistics, and stochastic processes, Probability, Statistics, and Stochastic Processes, Second Edition prepares readers to collect, analyze, and characterize data in their chosen fields. Beginning with three chapters that develop probability theory and introduce the axioms of probability, random variables, and joint distributions, the book goes on to present limit theorems and simulation. The authors combine a rigorous, calculus-based development of theory with an intuitive approach that appeals to readers' sense of reason and logic. Including more than 400 examples that help illustrate concepts and theory, the Second Edition features new material on statistical inference and a wealth of newly added topics, including: Consistency of point estimators Large sample theory Bootstrap simulation Multiple hypothesis testing Fisher's exact test and Kolmogorov-Smirnov test Martingales, renewal processes, and Brownian motion One-way analysis of variance and the general linear model Extensively class-tested to ensure an accessible presentation, Probability, Statistics, and Stochastic Processes, Second Edition is an excellent book for courses on probability and statistics at the upper-undergraduate level. The book is also an ideal resource for scientists and engineers in the fields of statistics, mathematics, industrial management, and engineering.

Qualitative Text Analysis - Udo Kuckartz 2014-01-23 How can you analyse narratives, interviews, field notes, or focus group data? Qualitative text analysis is ideal for these types of data and this textbook provides a hands-on introduction to the method and its theoretical underpinnings. It offers step-by-step instructions for implementing the three principal types of qualitative text analysis: thematic, evaluative, and type-building. Special attention is paid to how to present your results and use qualitative data analysis software packages, which are highly

recommended for use in combination with qualitative text analysis since they allow for fast, reliable, and more accurate analysis. The book shows in detail how to use software, from transcribing the verbal data to presenting and visualizing the results. The book is intended for Master's and Doctoral students across the social sciences and for all researchers concerned with the systematic analysis of texts of any kind.

Lectures on Harmonic Analysis - Thomas H. Wolff 2003-09-17
This book demonstrates how harmonic analysis can provide penetrating insights into deep aspects of modern analysis. It is both an introduction to the subject as a whole and an overview of those branches of harmonic analysis that are relevant to the Kakeya conjecture. The usual background material is covered in the first few chapters: the Fourier transform, convolution, the inversion theorem, the uncertainty principle and the method of stationary phase. However, the choice of topics is highly selective, with emphasis on those frequently used in research inspired by the problems discussed in the later chapters. These include questions related to the restriction conjecture and the Kakeya conjecture, distance sets, and Fourier transforms of singular measures. These problems are diverse, but often interconnected; they all combine sophisticated Fourier analysis with intriguing links to other areas of mathematics and they continue to stimulate first-rate work. The book focuses on laying out a solid foundation for further reading and research. Technicalities are kept to a minimum, and simpler but more basic methods are often favored over the most recent methods. The clear style of the exposition and the quick progression from fundamentals to advanced topics ensures that both graduate students and research mathematicians will benefit from the book.

Elements of Causal Inference - Jonas Peters 2017-11-29
A concise and self-contained introduction to causal inference, increasingly important in data science and machine learning. The mathematization of causality is a relatively recent development, and has become increasingly important in data science and machine learning. This book offers a self-contained and concise introduction to causal models and how to learn them from data. After explaining the need for causal models and discussing some of the principles underlying causal inference, the book teaches readers how to use causal models: how to compute intervention distributions, how to infer causal models from observational and interventional data, and how causal ideas could be exploited for classical machine learning problems. All of these topics are discussed first in terms of two variables and then in the more general multivariate case. The bivariate case turns out to be a particularly hard problem for causal learning because there are no conditional independences as used by classical methods for solving multivariate cases. The authors consider analyzing statistical asymmetries between cause and effect to be highly instructive, and they report on their decade of intensive research into this problem. The book is accessible to readers with a background in machine learning or statistics, and can be used in graduate courses or as a reference for researchers. The text includes code snippets that can be copied and pasted, exercises, and an appendix with a summary of the most important technical concepts.

Basic Algebra - Anthony W. Knapp 2007-07-28
Basic Algebra and Advanced Algebra systematically develop concepts and tools in algebra that are vital to every mathematician, whether pure or applied, aspiring or established. Together, the two books give the reader a global view of algebra and its role in mathematics as a whole. The presentation includes blocks of problems that introduce additional topics and applications to science and engineering to guide further study. Many examples and hundreds of problems are included, along with a separate 90-page section giving hints or complete solutions for most of the problems.

Spatially Independent Martingales, Intersections, and Applications - Pablo Shmerkin 2018-02-22
The authors define a class of random measures, spatially independent martingales, which we view as a natural generalization of the canonical random discrete set, and which includes as special cases many variants of fractal percolation and Poissonian cut-outs. The authors

pair the random measures with deterministic families of parametrized measures , and show that under some natural checkable conditions, a.s. the mass of the intersections is Hölder continuous as a function of . This continuity phenomenon turns out to underpin a large amount of geometric information about these measures, allowing us to unify and substantially generalize a large number of existing results on the geometry of random Cantor sets and measures, as well as obtaining many new ones. Among other things, for large classes of random fractals they establish (a) very strong versions of the Marstrand-Mattila projection and slicing results, as well as dimension conservation, (b) slicing results with respect to algebraic curves and self-similar sets, (c) smoothness of convolutions of measures, including self-convolutions, and nonempty interior for sumsets, and (d) rapid Fourier decay. Among other applications, the authors obtain an answer to a question of I. Łaba in connection to the restriction problem for fractal measures.

Spinors on Singular Spaces and the Topology of Causal Fermion Systems - Felix Finster 2019-06-10

Causal fermion systems and Riemannian fermion systems are proposed as a framework for describing non-smooth geometries. In particular, this framework provides a setting for spinors on singular spaces. The underlying topological structures are introduced and analyzed. The connection to the spin condition in differential topology is worked out. The constructions are illustrated by many simple examples such as the Euclidean plane, the two-dimensional Minkowski space, a conical singularity, a lattice system as well as the curvature singularity of the Schwarzschild space-time. As further examples, it is shown how complex and Kähler structures can be encoded in Riemannian fermion systems.

Mathematical Statistics with Applications in R - Kandethody M. Ramachandran 2014-09-14

Mathematical Statistics with Applications in R, Second Edition, offers a modern calculus-based theoretical introduction to mathematical statistics and applications. The book covers many modern statistical computational and simulation concepts that are not covered in other texts, such as the Jackknife, bootstrap methods, the EM algorithms, and Markov chain Monte Carlo (MCMC) methods such as the Metropolis algorithm, Metropolis-Hastings algorithm and the Gibbs sampler. By combining the discussion on the theory of statistics with a wealth of real-world applications, the book helps students to approach statistical problem solving in a logical manner. This book provides a step-by-step procedure to solve real problems, making the topic more accessible. It includes goodness of fit methods to identify the probability distribution that characterizes the probabilistic behavior or a given set of data. Exercises as well as practical, real-world chapter projects are included, and each chapter has an optional section on using Minitab, SPSS and SAS commands. The text also boasts a wide array of coverage of ANOVA, nonparametric, MCMC, Bayesian and empirical methods; solutions to selected problems; data sets; and an image bank for students. Advanced undergraduate and graduate students taking a one or two semester mathematical statistics course will find this book extremely useful in their studies. Step-by-step procedure to solve real problems, making the topic more accessible Exercises blend theory and modern applications Practical, real-world chapter projects Provides an optional section in each chapter on using Minitab, SPSS and SAS commands Wide array of coverage of ANOVA, Nonparametric, MCMC, Bayesian and empirical methods

Networking Seifert Surgeries on Knots - Arnaud Deruelle 2012

The authors propose a new approach in studying Dehn surgeries on knots in the 3-sphere S^3 yielding Seifert fiber spaces. The basic idea is finding relationships among such surgeries. To describe relationships and get a global picture of Seifert surgeries, they introduce ``seiferters'' and the Seifert Surgery Network, a 1-dimensional complex whose vertices correspond to Seifert surgeries. A seiferter for a Seifert surgery on a knot K is a trivial knot in S^3 disjoint from K that becomes a fiber in the resulting Seifert fiber space. Twisting K along its seiferter or an annulus cobounded by a pair of its seiferters yields another knot admitting a Seifert surgery. Edges of the network correspond to such twistings. A path in the network from one Seifert surgery to another explains how the former

Seifert surgery is obtained from the latter after a sequence of twistings along seiferters and/or annuli cobounded by pairs of seiferters. The authors find explicit paths from various known Seifert surgeries to those on torus knots, the most basic Seifert surgeries. The authors classify seiferters and obtain some fundamental results on the structure of the Seifert Surgery Network. From the networking viewpoint, they find an infinite family of Seifert surgeries on hyperbolic knots which cannot be embedded in a genus two Heegaard surface of S^3.

Gnucash 2.4 Small Business Accounting - Ashok Ramachandran 2011-02-09
Annotation Attention, small business owners! Stop tax-day stress. Stop procrastinating with a shoebox full of receipts. Stop reinventing the wheel with a spreadsheet. Stop making decisions simply on a hunch. Stop wasting money on software that is overkill. Start by downloading GnuCash and getting your accounts in order. Designed to be easy to use, yet powerful and flexible, GnuCash allows you to track bank accounts, income, and expenses. As quick and intuitive to use as a checkbook register, it is based on professional accounting principles to ensure balanced books and accurate reports.

You can do it and Gnucash 2.4 Small Business Accounting Beginner's Guide will help you get up and running with maintaining your accounts. Gnucash 2.4 Small Business Accounting Beginner's Guide speaks business language, not accountant-speak, because it is written by a former small business owner. It guides you to use GnuCash from scratch with step-by-step tutorials without jargon, pointing out the gotchas to avoid with lots of tips. It will teach you to work on routine business transactions while migrating transaction data from other applications gradually. You will be able to keep on top of transactions and run reports after reading just three chapters! Beyond Chapter 3, it is up to you how far you want to go. Reconcile with your bank and credit card statements. Charge and pay sales tax. Do invoicing. Track payments due. Set up reminders for bills. Avoid stress at tax time. Print checks. Capture expenses using your mobile phone. Gnucash 2.4 Small Business Accounting Beginner's Guide gives you the power. Know your numbers. Make decisions with confidence. Drive your business to its full potential. Get your accounts in order and avoid tax-day stress with this hands-on guide to GnuCash, the best free accounts software in the world.