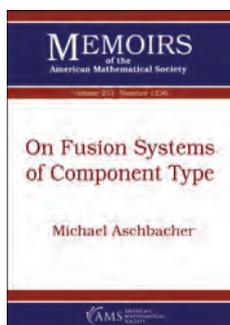


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Algebra and Algebraic Geometry



On Fusion Systems of Component Type

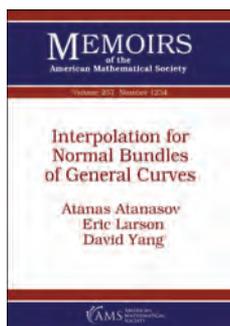
Michael Aschbacher, *California Institute of Technology, Pasadena, California*

Contents: Introduction; Preliminaries; Some lemmas on fusion systems; Tight embedding; More on tight embedding; Split extensions; Component combinatorics; The proof of Theorem 2;

Terminal components; Standard subsystems; Bibliography.

Memoirs of the American Mathematical Society, Volume 257, Number 1236

December 2018, 182 pages, Softcover, ISBN: 978-1-4704-3520-2, 2010 *Mathematics Subject Classification*: 20D05; 55R35, **Individual member US\$48.60**, List US\$81, Institutional member US\$64.80, Order code MEMO/257/1236



Interpolation for Normal Bundles of General Curves

Atanas Atanasov, *Harvard University, Cambridge, Massachusetts*, **Eric Larson**, *Stanford University, California*, and **David Yang**, *Massachusetts Institute of Technology, Cambridge, Massachusetts*

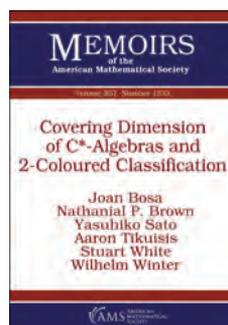
Contents: Introduction; Elementary modifications in arbitrary dimension; Elementary modifications for curves; Interpolation and short exact sequences; Elementary modifications of normal bundles; Examples of the bundles $N_{C \rightarrow \Lambda}$; Interpolation and specialization; Reducible curves and their normal bundles; A

stronger inductive hypothesis; Inductive arguments; Base cases; Summary of remainder of proof of Theorem 1.2; The three exceptional cases; Appendix A. remainder of proof of Theorem 1.2; Appendix B. Code for Section 4; Bibliography.

Memoirs of the American Mathematical Society, Volume 257, Number 1234

December 2018, 105 pages, Softcover, ISBN: 978-1-4704-3489-2, 2010 *Mathematics Subject Classification*: 14H99, **Individual member US\$48.60**, List US\$81, Institutional member US\$64.80, Order code MEMO/257/1234

Analysis



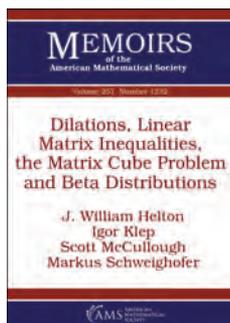
Covering Dimension of C^* -Algebras and 2-Coloured Classification

Joan Bosa, *University of Glasgow, Scotland, United Kingdom*, **Nathaniel P. Brown**, *The Pennsylvania State University, University Park, Pennsylvania*, **Yasuhiko Sato**, *Kyoto University, Japan*, **Aaron Tikuisis**, *University of Aberdeen, Scotland, United Kingdom*, **Stuart White**, *University of Glasgow, Scotland, United Kingdom*, and **University of Münster, Germany, and **Wilhelm Winter**, *University of Münster, Germany***

Contents: Introduction; Preliminaries; A 2×2 matrix trick; Ultrapowers of trivial W^* -bundles; Property (SI) and its consequences; Unitary equivalence of totally full positive elements; 2-coloured equivalence; Nuclear dimension and decomposition rank; Quasidiagonal traces; Kirchberg algebras; Addendum; Bibliography.

Memoirs of the American Mathematical Society, Volume 257, Number 1233

December 2018, 97 pages, Softcover, ISBN: 978-1-4704-3470-0, 2010 *Mathematics Subject Classification*: 46L05, 46L35, **Individual member US\$48.60**, List US\$81, Institutional member US\$64.80, Order code MEMO/257/1233



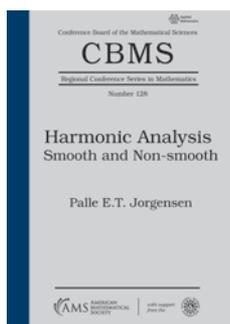
Dilations, Linear Matrix Inequalities, the Matrix Cube Problem and Beta Distributions

J. William Helton, *University of California, San Diego*, **Igor Klep**, *The University of Auckland, New Zealand*, **Scott McCullough**, *University of Florida, Gainesville, Florida*, and **Markus Schweighofer**, *Universität Konstanz, Germany*

Contents: Introduction; Dilations and free spectrahedral Inclusions; Lifting and averaging; A simplified form for \mathfrak{P} ; \mathfrak{P} is the optimal bound; The optimality condition $\alpha = \beta$ in terms of beta functions; Rank versus size for the matrix cube; Free spectrahedral inclusion generalities; Reformulation of the optimization problem; Simmons' theorem for half integers; Bounds on the median and the equipoint of the Beta distribution; Proof of Theorem 2.1; Estimating $\mathfrak{P}(d)$ for Odd d .; Dilations and inclusions of Balls; Probabilistic theorems and interpretations continued; Bibliography; Index.

Memoirs of the American Mathematical Society, Volume 257, Number 1232

December 2018, 104 pages, Softcover, ISBN: 978-1-4704-3455-7, 2010 *Mathematics Subject Classification*: 47A20, 46L07, 13J30, 60E05, 33B15, 90C22, **Individual member US\$48.60**, List US\$81, Institutional member US\$64.80, Order code MEMO/257/1232



Harmonic Analysis Smooth and Non-smooth

Palle E.T. Jorgensen, *University of Iowa, Iowa City, IA*

There is a recent and increasing interest in harmonic analysis of non-smooth geometries. Real-world examples where these types of geometry appear include large computer networks, relationships in datasets, and fractal structures such as

those found in crystalline substances, light scattering, and other natural phenomena where dynamical systems are present.

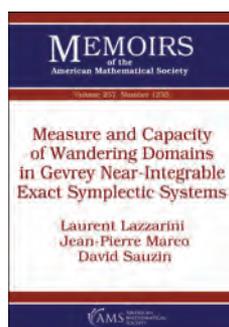
Notions of harmonic analysis focus on transforms and expansions and involve dual variables. In this book on smooth and non-smooth harmonic analysis, the notion of dual variables will be adapted to fractals. In addition to harmonic analysis via *Fourier duality*, the

author also covers *multiresolution wavelet* approaches as well as a third tool, namely, L^2 spaces derived from appropriate *Gaussian processes*. The book is based on a series of ten lectures delivered in June 2018 at a CBMS conference held at Iowa State University.

Contents: Introduction. Smooth vs the non-smooth categories; Spectral pair analysis for IFSs; Harmonic analyses on fractals, with an emphasis on iterated function systems (IFS) measures; Four kinds of harmonic analysis; Harmonic analysis via representations of the Cuntz relations; *Positive definite functions* and kernel analysis; Representations of *Lie groups*. Non-commutative harmonic analysis; Bibliography; Index.

CBMS Regional Conference Series in Mathematics, Number 128

November 2018, 266 pages, Softcover, ISBN: 978-1-4704-4880-6, LC 2018030996, 2010 *Mathematics Subject Classification*: 28A80, 81Q35, 11K70, 60J70, 42C40, 60G22, 37A45, 42B37, **AMS members US\$41.60**, List US\$52, Order code CBMS/128



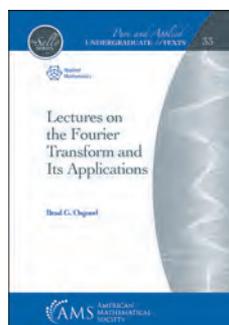
Measure and Capacity of Wandering Domains in Gevrey Near-Integrable Exact Symplectic Systems

Laurent Lazzarini, *Université Paris VI, France*, **Jean-Pierre Marco**, *Université Paris VI, France*, and **David Sauzin**, *Observatoire de Paris, France*

Contents: Introduction; Presentation of the results; Stability theory for Gevrey near-integrable maps; A quantitative KAM result—proof of Part (i) of Theorem D; Coupling devices, multi-dimensional periodic domains, wandering domains; Appendices; Appendix A. Algebraic operations in \mathcal{O}_k ; Appendix B. Estimates on Gevrey maps; Appendix C. Generating functions for exact symplectic C^∞ maps; Appendix D. Proof of Lemma 2.5; Bibliography.

Memoirs of the American Mathematical Society, Volume 257, Number 1235

December 2018, 106 pages, Softcover, ISBN: 978-1-4704-3492-2, 2010 *Mathematics Subject Classification*: 53D22, 70H08; 26E10, **Individual member US\$48.60**, List US\$81, Institutional member US\$64.80, Order code MEMO/257/1235



Lectures on the Fourier Transform and Its Applications

Brad G. Osgood, *Stanford University, CA*

This book is derived from lecture notes for a course on Fourier analysis for engineering and science students at the advanced undergraduate or beginning graduate level. Beyond teaching specific topics and techniques—all of which are important in many areas of engineering and

science—the author’s goal is to help engineering and science students cultivate more advanced mathematical know-how and increase confidence in learning and using mathematics, as well as appreciate the coherence of the subject. He promises the readers a little magic on every page.

The section headings are all recognizable to mathematicians, but the arrangement and emphasis are directed toward students from other disciplines. The material also serves as a foundation for advanced courses in signal processing and imaging. There are over 200 problems, many of which are oriented to applications, and a number use standard software. An unusual feature for courses meant for engineers is a more detailed and accessible treatment of distributions and the generalized Fourier transform. There is also more coverage of higher-dimensional phenomena than is found in most books at this level.

A thoroughly enjoyable yet careful mathematical perspective of the underlying concepts and many applications of modern signal analysis.

—*Les Atlas, University of Washington*

Osgood leads his readers from the basics to the more sophisticated parts of applicable Fourier analysis with a lively style, a light touch on the technicalities, and an eye toward communications engineering. This book should be a great resource for students of mathematics, physics, and engineering alike.

—*Gerald B. Folland, University of Washington*

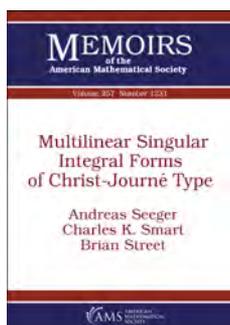
Fourier analysis with a swing in its step.

—*Tom Körner, University of Cambridge*

Contents: Fourier series; Fourier transform; Convolution; Distributions and their Fourier transforms; δ hard at work; Sampling and interpolation; Discrete Fourier transform; Linear time-invariant systems; n -Dimensional Fourier transform; A list of mathematical topics that are fair game; Complex numbers and complex exponentials; Geometric sums; Index.

Pure and Applied Undergraduate Texts, Volume 33

March 2019, approximately 702 pages, Hardcover, ISBN: 978-1-4704-4191-3, LC 2017061807, 2010 *Mathematics Subject Classification:* 42A38, 42B10, 65T50, 94A20, 46F10, **AMS members US\$92**, List US\$115, Order code AMSTEXT/33



Multilinear Singular Integral Forms of Christ-Journé Type

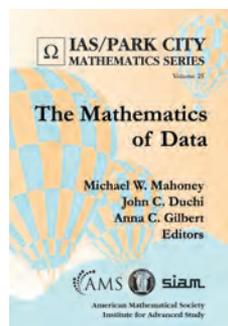
Andreas Seeger, University of Wisconsin, Madison, Charles K. Smart, University of Chicago, Illinois, and Brian Street, University of Wisconsin, Madison

Contents: Introduction; Statements of the main results; Kernels; Adjoints; Outline of the proof of boundedness; Some auxiliary operators; Basic L^2 estimates; Some results from Calderón-Zygmund theory; Almost orthogonality; Boundedness of multilinear singular forms; Proof of the main theorem: Part I; Proof of the main theorem: Part II; Proof of the main theorem: Part III; Proof of the main theorem: Part IV; Proof of the main theorem: Part V; Interpolation; Bibliography.

Memoirs of the American Mathematical Society, Volume 257, Number 1231

December 2018, 142 pages, Softcover, ISBN: 978-1-4704-3437-3, 2010 *Mathematics Subject Classification:* 42B20, **Individual member US\$48.60**, List US\$81, Institutional member US\$64.80, Order code MEMO/257/1231

Applications



The Mathematics of Data

Michael W. Mahoney, University of California, Berkeley, John C. Duchi, Stanford University, CA, and Anna C. Gilbert, University of Michigan, Ann Arbor, Editors

Data science is a highly interdisciplinary field, incorporating ideas from applied mathematics, statistics, probability, and computer science, as well as many other areas. This book gives an introduction to the mathematical methods that form the foundations of machine learning and data science, presented by leading experts in computer science, statistics, and applied mathematics. Although the chapters can be read independently, they are designed to be read together as they lay out algorithmic, statistical, and numerical approaches in diverse but complementary ways.

This book can be used both as a text for advanced undergraduate and beginning graduate courses, and as a survey for researchers interested in understanding how applied mathematics broadly defined is being used in data science. It will appeal to anyone interested in the interdisciplinary foundations of machine learning and data science.

Titles in this series are co-published with the Institute for Advanced Study/Park City Mathematics Institute.

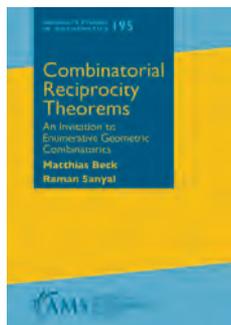
This volume is a co-publication of the AMS, IAS/Park City Mathematics Institute, and Society for Industrial and Applied Mathematics

Contents: P. Drineas and M. W. Mahoney, Lectures on randomized numerical linear algebra; S. J. Wright, Optimization algorithms for data analysis; J. C. Duchi, Introductory lectures on stochastic optimization; P.-G. Martinsson, Randomized methods for matrix computations; R. Vershynin, Four lectures on probabilistic methods for data science; R. Ghrist, Homological algebra and data.

IAS/Park City Mathematics Series, Volume 25

November 2018, 325 pages, Hardcover, ISBN: 978-1-4704-3575-2, LC 2018024239, 2010 *Mathematics Subject Classification:* 15-02, 52-02, 60-02, 62-02, 65-02, 68-02, 90-02, **AMS members US\$83.20**, List US\$104, Order code PCMS/25

Discrete Mathematics and Combinatorics



Combinatorial Reciprocity Theorems

An Invitation to Enumerative Geometric Combinatorics

Matthias Beck, *San Francisco State University, CA*, and Raman Sanyal, *Goethe-Universität Frankfurt, Germany*

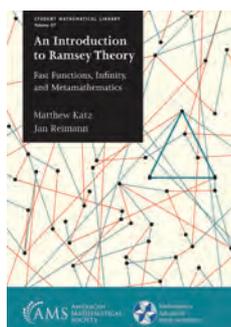
Combinatorial reciprocity is a very interesting phenomenon, which can be described as follows: A polynomial, whose values at positive integers count combinatorial objects of some sort, may give the number of combinatorial objects of a different sort when evaluated at negative integers (and suitably normalized). Such combinatorial reciprocity theorems occur in connections with graphs, partially ordered sets, polyhedra, and more. Using the combinatorial reciprocity theorems as a leitmotif, this book unfolds central ideas and techniques in enumerative and geometric combinatorics.

Written in a friendly writing style, this is an accessible graduate textbook with almost 300 exercises, numerous illustrations, and pointers to the research literature. Topics include concise introductions to partially ordered sets, polyhedral geometry, and rational generating functions, followed by highly original chapters on subdivisions, geometric realizations of partially ordered sets, and hyperplane arrangements.

Contents: Four polynomials; Partially ordered sets; Polyhedral geometry; Rational generating functions; Subdivisions; Partially ordered sets, geometrically; Hyperplane arrangements; Bibliography; Notation index; Index.

Graduate Studies in Mathematics, Volume 195

December 2018, approximately 314 pages, Hardcover, ISBN: 978-1-4704-2200-4, 2010 *Mathematics Subject Classification:* 05Axx, 05C31, 05E45, 11P21, 52B05, 52B11, 52B20, 52B45, 52C07, 68R05, **AMS members US\$58.40**, List US\$73, Order code GSM/195



An Introduction to Ramsey Theory

Fast Functions, Infinity, and Metamathematics

Matthew Katz, *Pennsylvania State University, University Park, PA*, and Jan Reimann, *Pennsylvania State University, University Park, PA*

This book takes the reader on a journey through Ramsey theory, from graph theory and combinatorics to set theory to logic and metamathematics. Written in an informal style with few prerequisites, it develops two basic principles of Ramsey theory:

many combinatorial properties persist under partitions, but to witness this persistence, one has to start with very large objects. The interplay between those two principles not only produces beautiful theorems but also touches the very foundations of mathematics. In the course of this book, the reader will learn about both aspects. Among the topics explored are Ramsey's theorem for graphs and hypergraphs, van der Waerden's theorem on arithmetic progressions, infinite ordinals and cardinals, fast growing functions, logic and provability, Gödel incompleteness, and the Paris-Harrington theorem.

Quoting from the book, "There seems to be a murky abyss lurking at the bottom of mathematics. While in many ways we cannot hope to reach solid ground, mathematicians have built impressive ladders that let us explore the depths of this abyss and marvel at the limits and at the power of mathematical reasoning at the same time. Ramsey theory is one of those ladders."

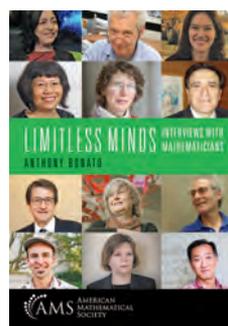
This item will also be of interest to those working in logic and foundations.

Contents: Graph Ramsey theory; Infinite Ramsey theory; Growth of Ramsey functions; Metamathematics; Bibliography; Notation; Index.

Student Mathematical Library, Volume 87

November 2018, 207 pages, Softcover, ISBN: 978-1-4704-4290-3, LC 2018024651, 2010 *Mathematics Subject Classification:* 05D10, 03-01, 03E10, 03B10, 03B25, 03D20, 03H15, **All Individuals US\$41.60**, List US\$52, Institutional member US\$41.60, Order code STML/87

General Interest



Limitless Minds

Interviews with Mathematicians

Anthony Bonato, *Ryerson University, Toronto, ON, Canada*

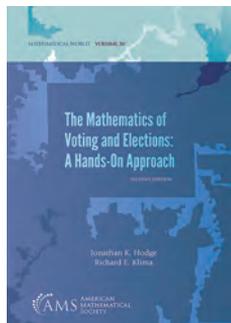
Every mathematician is a person with a story. *Limitless Minds* tells those stories in an engaging way by featuring interviews with twelve leading mathematicians.

They were invited to answer some key questions such as: Who and what were the influences that pointed them towards mathematics? Why do mathematicians devote their lives to discovering new mathematics? How do they see mathematics evolving in the future?

The book, written in an accessible style and enriched by dozens of images, offers a rare insight into the minds of mathematicians, provided in their own words. It will enlighten and inspire readers about the lives, passions, and discoveries of mathematicians.

Contents: Interview with Alejandro Adem; Interview with Federico Ardila; Interview with Jennifer Chayes; Interview with Maria Chudnovsky; Interview with Fan Chung Graham; Interview with Ingrid Daubechies; Interview with Nassif Ghoussoub; Interview with Lisa Jeffrey; Interview with Izabella Laba; Interview with Barry Mazur; Interview with Richard Nowakowski; Interview with Ken Ono; Index.

December 2018, 155 pages, Softcover, ISBN: 978-1-4704-4791-5, 2010 *Mathematics Subject Classification*: 01A70, 01A65, AMS members US\$23.20, List US\$29, Order code MBK/118



The Mathematics of Voting and Elections: A Hands-On Approach

Second Edition

Jonathan K. Hodge, *Grand Valley State University, Allendale, MI*, and **Richard E. Klima**, *Appalachian State University, Boone, NC*

The Mathematics of Voting and Elections: A Hands-On Approach, Second Edition, is an inquiry-based approach to the mathematics of politics and social choice. The aim of the book is to give readers who might not normally choose to engage with mathematics recreationally the chance to discover some interesting mathematical ideas from within a familiar context, and to see the applicability of mathematics to real-world situations. Through this process, readers should improve their critical thinking and problem solving skills, as well as broaden their views of what mathematics really is and how it can be used in unexpected ways. The book was written specifically for non-mathematical audiences and requires virtually no mathematical prerequisites beyond basic arithmetic. At the same time, the questions included are designed to challenge both mathematical and non-mathematical audiences alike. More than giving the right answers, this book asks the right questions.

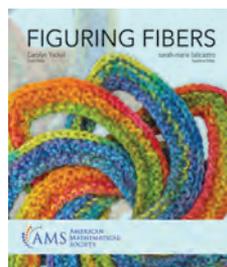
The book is fun to read, with examples that are not just thought-provoking, but also entertaining. It is written in a style that is casual without being condescending. But the discovery-based approach of the book also forces readers to play an active role in their learning, which should lead to a sense of ownership of the main ideas in the book. And while the book provides answers to some of the important questions in the field of mathematical voting theory, it also leads readers to discover new questions and ways to approach them.

In addition to making small improvements in all the chapters, this second edition contains several new chapters. Of particular interest might be Chapter 12 which covers a host of topics related to gerrymandering.

Contents: What's so good about majority rule?; Le Pen, Nader, and other inconveniences; Back into the ring; Trouble in democracy; Explaining the impossible; Gaming the system; One person, one vote?; Calculating corruption; The ultimate college experience; Trouble in direct democracy; Proportional (mis)representation; Choosing your voters; Bibliography; Index.

Mathematical World, Volume 30

November 2018, approximately 247 pages, Softcover, ISBN: 978-1-4704-4287-3, 2010 *Mathematics Subject Classification*: 91B12, AMS members US\$41.60, List US\$52, Order code MAWRLD/30



Figuring Fibers

Carolyn Yackel, *Mercer University, Macon, GA*, and **sarah-marie belcastro**, *MathILy, Mathematical Staircase, Inc., Holyoke, MA*, and *Smith College, Northampton, MA*, Editors

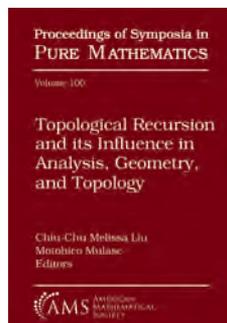
Pick up this book and dive into one of eight chapters relating mathematics to fiber arts! Amazing exposition transports

any interested person on a mathematical exploration that is rigorous enough to capture the hearts of mathematicians. The zenith of creativity is achieved as readers are led to knit, crochet, quilt, or sew a project specifically designed to illuminate the mathematics through its physical realization. The beautiful finished pieces provide a visual understanding of the mathematics that can be shared with those who view them. If you love mathematics or fiber arts, this book is for you!

Contents: C. Yackel, Introduction; D. J. Wildstrom, More granny, less square; K. Calderhead, Gosper-like fractals and intermeshed crochet; C. Yackel, Templeton square truchet tiles; M. D. Shepherd, Variations on snake trail quilting patterns; B. N. Givens, The Chinese remainder theorem and knitting stitch patterns; s.-m. belcastro, Knitting torus knots and links; S. L. Gould, Triply periodic polyhedra in Euclidean three-dimensional space; B. E. Nimershiem, Piecing together link complements; Index.

December 2018, 232 pages, Hardcover, ISBN: 978-1-4704-2931-7, LC 2018033586, 2010 *Mathematics Subject Classification*: 00A05, 00A06, 00A08, 00A66, 05A10, 05C99, 11A99, 52B10, 57M25, 28A80, AMS members US\$32, List US\$40, Order code MBK/117

Geometry and Topology



Topological Recursion and its Influence in Analysis, Geometry, and Topology

Chiu-Chu Melissa Liu, *Columbia University, New York*, and **Motihico Mulase**, *University of California, Davis*, Editors

This volume contains the proceedings of the 2016 AMS von Neumann Symposium on Topological Recursion and its Influence in Analysis, Geometry, and Topology, which was held from July 4–8, 2016, at the Hilton Charlotte University Place, Charlotte, North Carolina.

The papers contained in the volume present a snapshot of rapid and rich developments in the emerging research field known as *topological recursion*. It has its origin around 2004 in random matrix theory and also in Mirzakhani's work on the volume of moduli spaces of hyperbolic surfaces.

Topological recursion has played a fundamental role in connecting seemingly unrelated areas of mathematics such as matrix models,

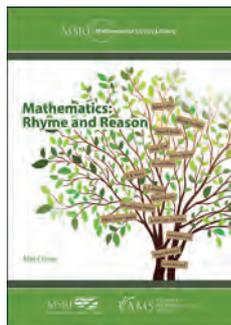
enumeration of Hurwitz numbers and Grothendieck's dessins d'enfants, Gromov-Witten invariants, the A-polynomials and colored polynomial invariants of knots, WKB analysis, and quantization of Hitchin moduli spaces. In addition to establishing these topics, the volume includes survey papers on the most recent key accomplishments: discovery of the unexpected relation to semi-simple cohomological field theories and a solution to the *remodeling conjecture*. It also provides a glimpse into the future research direction; for example, connections with the Airy structures, modular functors, Hurwitz-Frobenius manifolds, and ELSV-type formulas.

Contents: J. E. Andersen, G. Borot, and N. Orantin, Modular functors, cohomological field theories, and topological recursion; A. Brini, On the Gopakumar-Ooguri-Vafa correspondence for Clifford-Klein 3-manifolds; L. Chen, Bouchard-Klemm-Marino-Pasquetti conjecture for \mathbb{C}^3 ; A. Chiodo and J. Nagel, The hybrid Landau-Ginzburg models of Calabi-Yau complete intersections; P. Ciosmak, L. Hadasz, M. Manabe, and P. Sułkowski, Singular vector structure of quantum curves; N. Do and M. Karev, Towards the topological recursion for double Hurwitz numbers; O. Dumitrescu and M. Mulase, Quantization of spectral curves for meromorphic Higgs bundles through topological recursion; P. Dunin-Barkowski, Topological recursion and Givental's formalism: Spectral curves for Gromov-Witten theories; P. Dunin-Barkowski, P. Norbury, N. Orantin, A. Popolitov, and S. Shadrin, Primary invariants of Hurwitz Frobenius manifolds; J. N. Esteves, Hopf algebras and topological recursion; B. Fang and Z. Zong, Graph sums in the remodeling conjecture; T. Kimura, Double quantization of Seiberg-Witten geometry and W-algebras; M. Kontsevich and Y. Soibelman, Airy structures and symplectic geometry of topological recursion; D. Korotkin, Periods of meromorphic quadratic differentials and Goldman bracket; D. Lewanski, On ELSV-type formulae, Hurwitz numbers and topological recursion; X. Liu, M. Mulase, and A. Sorkin, Quantum curves for simple Hurwitz numbers of an arbitrary base curve.

Proceedings of Symposia in Pure Mathematics, Volume 100

December 2018, approximately 561 pages, Hardcover, ISBN: 978-1-4704-3541-7, 2010 *Mathematics Subject Classification*: 14H10, 14H15, 14H60, 14J33, 14N10, 14N35, 53D45, 81T45, **AMS members US\$106.40**, List US\$133, Order code PSPUM/100

Math Education



Mathematics: Rhyme and Reason

Mel Currie

Mathematics: Rhyme and Reason is an exploration of the aesthetic value of mathematics and the culture of the mathematics community.

This book introduces budding mathematicians of all ages to mathematical ways of thinking through a series of chapters that

mix episodes from the author's life with explanations of intriguing mathematical concepts and the stories of the mathematicians who discovered them. The chapters can be read independently, and most require only a background in basic high school algebra or geometry to appreciate the topics covered.

Part personal memoir, part appreciation of the poetry and humanity inherent in mathematics, this entertaining collection of stories, theorems, and reflections will be of interest to anyone curious about mathematics and the human beings who practice it.

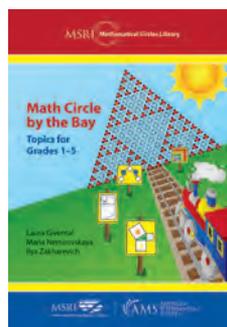
In the interest of fostering a greater awareness and appreciation of mathematics and its connections to other disciplines and everyday life, MSRI and the AMS are publishing books in the Mathematical Circles Library series as a service to young people, their parents and teachers, and the mathematics profession.

Titles in this series are co-published with the Mathematical Sciences Research Institute (MSRI).

Contents: The riddle; Primes; Some geometry; Mysterious pattern; Some things add up. Some don't.; A tangential remark; Plus or minus; Making the optimal choice; Impossibilities; Magnitudes of infinity; The inevitable (Sperner's Lemma—The Brouwer fixed-point theorem); Consider the sequence (Fibonacci and Golden Ratio); What are the chances?; The Euler line; The dissertation; The next prime number is? (Gandhi's formula); Bulgarian solitaire; Which is bigger? (a^b versus b^a); Fascinating; From the sublime to the ridiculous; A few more words; Photos and pictures; Notation, etc.; Mysterious; Impossibilities; Magnitudes; Fascinating.

MSRI Mathematical Circles Library, Volume 22

November 2018, 178 pages, Softcover, ISBN: 978-1-4704-4796-0, LC 2018028165, 2010 *Mathematics Subject Classification*: 00A09, 97A80, **AMS members US\$32.80**, List US\$41, Order code MCL/22



Math Circle by the Bay Topics for Grades 1-5

Laura Givental, *United Math Circles Foundation, Berkeley and Stanford, CA*, Maria Nemirovskaya, *University of Oregon, Eugene*, and Ilya Zakharevich, *United Math Circles Foundation, Berkeley and Stanford, CA*

This book is based on selected topics that the authors taught in math circles for elementary school students at the University of California, Berkeley; Stanford University; Dominican University (Marin County, CA); and the University of Oregon (Eugene). It is intended for people who are already running a math circle or who are thinking about organizing one. It can be used by parents to help their motivated, math-loving kids or by elementary school teachers. We also hope that bright fourth or fifth-graders will be able to read this book on their own.

The main features of this book are the logical sequence of the problems, the description of class reactions, and the hints given to kids when they get stuck. This book tries to keep the balance between two goals: inspire readers to invent their own original approaches while being detailed enough to work as a fallback in case the teacher needs to prepare a lesson on short notice. It introduces kids to combinatorics, Fibonacci numbers, Pascal's

triangle, and the notion of area, among other things. The authors chose topics with deep mathematical context. These topics are just as engaging and entertaining to children as typical “recreational math” problems, but they can be developed deeper and to more advanced levels.

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.

This item will also be of interest to those working in general interest.

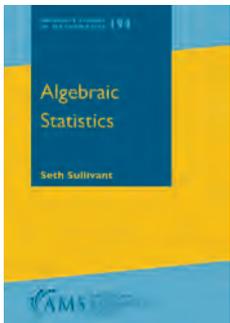
Titles in this series are co-published with the Mathematical Sciences Research Institute (MSRI).

Contents: Numbers as geometric shapes; Combinatorics; Fibonacci numbers; Pascal’s triangle; Area; Selected warmup and challenging problems; Handouts; Bibliography; Index.

MSRI Mathematical Circles Library, Volume 21

December 2018, approximately 179 pages, Softcover, ISBN: 978-1-4704-4785-4, LC 2018025745, 2010 *Mathematics Subject Classification:* 00A05, 00A07, 00A08, 00A09, 97-01, 97A20, 97A80, 97D50, 97E40, 97E50, **AMS members US\$20**, List US\$25, Order code MCL/21

Probability and Statistics



Algebraic Statistics

Seth Sullivant, *North Carolina State University, Raleigh, NC*

Algebraic statistics uses tools from algebraic geometry, commutative algebra, combinatorics, and their computational sides to address problems in statistics and its applications. The starting point for this connection is the observation that many statistical models are semialgebraic sets. The algebra/statistics connection is

now over twenty years old, and this book presents the first broad introductory treatment of the subject. Along with background material in probability, algebra, and statistics, this book covers a range of topics in algebraic statistics including algebraic exponential families, likelihood inference, Fisher’s exact test, bounds on entries of contingency tables, design of experiments, identifiability of hidden variable models, phylogenetic models, and model selection. With numerous examples, references, and over 150 exercises, this book is suitable for both classroom use and independent study.

This item will also be of interest to those working in applications.

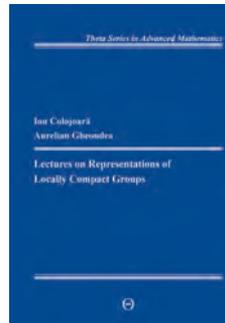
Contents: Introduction; Probability primer; Algebra primer; Conditional independence; Statistics primer; Exponential families; Likelihood inference; The cone of sufficient statistics; Fisher’s exact test; Bounds on cell entries; Exponential random graph models; design of experiments; graphical models; Hidden variables; Phylogenetic models; Identifiability; Model selection and Bayesian integrals; MAP estimation and parametric inference; Finite metric spaces; Bibliography; Index.

Graduate Studies in Mathematics, Volume 194

December 2018, 490 pages, Hardcover, ISBN: 978-1-4704-3517-2, LC 2018025744, 2010 *Mathematics Subject Classification:* 62-01, 14-01, 13P10, 13P15, 14M12, 14M25, 14P10, 14T05, 52B20, 60J10, 62F03, 62H17, 90C10, 92D15, **AMS members US\$66.40**, List US\$83, Order code GSM/194

New AMS-Distributed Publications

Algebra and Algebraic Geometry



Lectures on Representations of Locally Compact Groups

Ion Colojoară, *University of Bucharest, Romania, and Aurelian Gheondea*, *Bilkent University, Ankara, Turkey, and IMAR, Bucharest, Romania*

This is a modern presentation of the theory of representations of locally compact groups. In a small number of pages, the reader can get some of the most important theorems on this subject. Many examples are provided.

Highlights of the volume include:

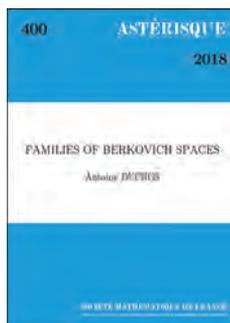
- (1) A generous introduction explaining the origins of group theory and their representations, the motivation for the main problems in this theory, and the deep connections with modern physics.
- (2) A solid presentation of the theory of topological groups and of Lie groups.
- (3) Two proofs of the existence of Haar measures.
- (4) The detailed study of continuous representations on general locally convex spaces, with an emphasis on unitary representations of compact groups on Hilbert spaces.
- (5) A careful presentation of induced representations on locally convex spaces and G. W. Mackey’s Theorem of Imprimitivity.

About half of the results included in this volume appear for the first time in a book, while the theory of p -induced representations on locally convex spaces is new. To facilitate reading, several appendices present the concepts and basic results from general topology, differential manifolds, abstract measures and integration, topological vector spaces, Banach spaces, Banach algebras, C^* -algebras, and operator theory on Hilbert spaces.

A publication of the Theta Foundation. Distributed worldwide, except in Romania, by the AMS.

International Book Series of Mathematical Texts

September 2018, 186 pages, Hardcover, ISBN: 978-606-8443-10-2, 2010 *Mathematics Subject Classification*: 22-01; 22D12, 22D30, **AMS members US\$47.20**, List US\$59, Order code THETA/24



Families of Berkovich Spaces

Antoine Ducros, *Sorbonne Université, Paris, France*

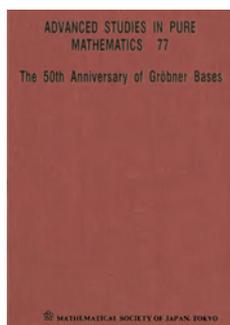
This book investigates the variation of the properties of the fibers of a map between analytic spaces in the sense of Berkovich. First, the author studies flatness in this setting; the naive definition of this notion is not reasonable and he explains

why. He then describes the loci of fiberwise validity of some usual properties (e.g., Cohen-Macaulay, Gorenstein, geometrically regular). He shows that these are (locally) Zariski-constructible subsets of the source space. For that purpose, he develops systematic methods for “spreading out” in Berkovich geometry, as is done in scheme theory, some properties from a generic fiber to a neighborhood of it.

A publication of the Société Mathématique de France, Marseilles (SMF), distributed by the AMS in the U.S., Canada, and Mexico. Orders from other countries should be sent to the SMF. Members of the SMF receive a 30% discount from list.

Astérisque, Number 400

June 2018, 262 pages, Softcover, ISBN: 978-2-85629-885-5, 2010 *Mathematics Subject Classification*: 14G22, 14A99, **AMS members US\$60**, List US\$75, Order code AST/400



The 50th Anniversary of Gröbner Bases

Takayuki Hibi, *Osaka University, Japan*, Editor

The discovery of the algorithm by Bruno Buchberger in July 1965, the so-called Buchberger algorithm used to compute Gröbner bases of ideals of the polynomial ring, led to the birth of the exciting research area in modern mathematics called computer algebra.

The 8th Mathematical Society of Japan Seasonal Institute (MSJ SI 2015), entitled The 50th Anniversary of Gröbner Bases, was held in July 2015. This volume contains the proceedings of MSJ SI 2015 and consists of 14 papers related to computer algebra, algebraic statistics, D-modules, convex polytopes, and toric ideals. These papers enable readers to explore current trends in Gröbner bases. Young researchers will find a treasury of fascinating problems which are pending. The foreword was contributed by Bruno Buchberger and includes a secret story on the discovery of the Buchberger algorithm.

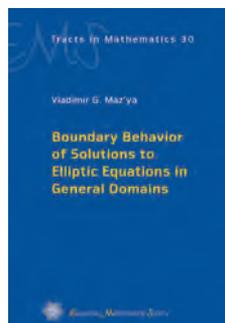
This item will also be of interest to those working in discrete mathematics and combinatorics.

Published for the Mathematical Society of Japan by Kinokuniya, Tokyo, and distributed worldwide, except in Japan, by the AMS.

Advanced Studies in Pure Mathematics, Volume 77

August 2018, 436 pages, Hardcover, ISBN: 978-4-86497-052-5, 2010 *Mathematics Subject Classification*: 13P10; 05E40, 14F10, 14M25, 33F10, 46F10, 52B20, 62H05, 62E15, **AMS members US\$54.40**, List US\$68, Order code ASPM/77

Differential Equations



Boundary Behavior of Solutions to Elliptic Equations in General Domains

Vladimir G. Maz'ya, *Linköping University, Sweden, and University of Liverpool, UK*

This book is a detailed exposition of the author and his collaborators' work on boundedness, continuity, and differentiability properties of solutions to elliptic equations in general domains, that is, in domains that are not a priori restricted by assumptions such as “piecewise smoothness” or being a “Lipschitz graph”.

The description of the boundary behavior of such solutions is one of the most difficult problems in the theory of partial differential equations. After the famous Wiener test, the main contributions to this area were made by the author. In particular, necessary and sufficient conditions for the validity of imbedding theorems are given, which provide criteria for the unique solvability of boundary value problems of second and higher order elliptic equations. Another striking result is a test for the regularity of a boundary point for polyharmonic equations.

This book will be interesting and useful for a wide audience. It is intended for specialists and graduate students working in the theory of partial differential equations.

This item will also be of interest to those working in analysis.

A publication of the European Mathematical Society (EMS). Distributed within the Americas by the American Mathematical Society.

EMS Tracts in Mathematics, Volume 30

October 2018, 441 pages, Hardcover, ISBN: 978-3-03719-190-3, 2010 *Mathematics Subject Classification*: 35J40, 31B15, 31B25, **AMS members US\$78.40**, List US\$98, Order code EMSTM/30

General Interest



Operator Theory: Themes and Variations

Conference Proceedings,
Timișoara, June 27–July 2,
2016

Hari Bercovici, *Indiana University, Bloomington*,
Dumitru Gaspar, *West University of Timișoara, Romania*, **Dan Timotin**, *Romanian Academy, Bucharest, Romania*, and **Florian-Horia Vasilescu**, *University of Lille, France*, Editors

This volume contains the proceedings of the 26th International Conference on Operator Theory, held from June 27–July 2, 2016, in Timișoara, Romania. It consists of a careful selection of papers. One of the highlights is an extended presentation of the helicoidal method in harmonic analysis.

Other subjects covered include function theory on the unit disc; free holomorphic functions; applications of Toeplitz operators; traces on ideals of operators; geodesics of projections on Hilbert space; preserver problems; Sturm Liouville operators; and Bratteli diagrams.

This item will also be of interest to those working in analysis.

A publication of the Theta Foundation. Distributed worldwide, except in Romania, by the AMS.

International Book Series of Mathematical Texts

November 2018, 204 pages, Hardcover, ISBN: 978-606-8443-09-6, 2010 *Mathematics Subject Classification*: 00B25, 30-06, 42-06, 46-06, 47-06, **AMS members US\$44.80**, List US\$56, Order code THETA/23

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