
Oxford Users Guide To Mathematics

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Oxford Users' Guide to Mathematics *Oxford University Press*

The Oxford Users' Guide to Mathematics is one of the leading handbooks on mathematics available. It presents a comprehensive modern picture of mathematics and emphasises the relations between the different branches of mathematics, and the applications of mathematics in engineering and the natural sciences. The Oxford User's Guide covers a broad spectrum of mathematics starting with the basic material and progressing on to more advanced topics that have come to the fore in the last few decades. The book is organised into mathematical sub-disciplines including analysis, algebra, geometry, foundations of mathematics, calculus of variations and optimisation, theory of probability and mathematical statistics, numerical mathematics and scientific computing, and history of mathematics. The book is supplemented by numerous tables on infinite series, special functions, integrals, integral transformations, mathematical statistics, and fundamental constants in physics. It also includes a comprehensive bibliography of key contemporary literature as well as an extensive glossary and index. The wealth of material, reaching across all levels and numerous sub-disciplines, makes The Oxford User's Guide to Mathematics an invaluable reference source for students of engineering, mathematics, computer science, and the natural sciences, as well as teachers, practitioners, and researchers in industry and academia.

Mathematics - Applications and Interpretation

Featuring a wealth of digital content, this concept-based Print and Enhanced Online Course Book Pack has been developed in cooperation with the IB to provide the most comprehensive support for the new DP Mathematics: applications and interpretation HL syllabus, for first teaching in September 2019.

A Course in Algebra *American Mathematical Soc.*

Great book! The author's teaching experience shows in every chapter. --Efim Zelmanov, University of California, San Diego Vinberg has written an algebra book that is excellent, both as a classroom text or for self-study. It is plain that years of teaching abstract algebra have enabled him to say the right thing at the right time. --Irving Kaplansky, MSRI This is a comprehensive text on modern algebra written for advanced undergraduate and basic graduate algebra classes. The book is based on courses taught by the author at the Mechanics and Mathematics Department of Moscow State University and at the Mathematical College of the Independent University of Moscow. The unique feature of the book is that it contains almost no technically difficult proofs. Following his point of view on mathematics, the author tried, whenever possible, to replace calculations and difficult deductions with conceptual proofs and to associate geometric images to algebraic objects. Another

important feature is that the book presents most of the topics on several levels, allowing the student to move smoothly from initial acquaintance to thorough study and deeper understanding of the subject. Presented are basic topics in algebra such as algebraic structures, linear algebra, polynomials, groups, as well as more advanced topics like affine and projective spaces, tensor algebra, Galois theory, Lie groups, associative algebras and their representations. Some applications of linear algebra and group theory to physics are discussed. Written with extreme care and supplied with more than 200 exercises and 70 figures, the book is also an excellent text for independent study.

The Oxford Handbook of the History of Mathematics *Oxford University Press on Demand*

This handbook explores the history of mathematics, addressing what mathematics has been and what it has meant to practise it. 36 self-contained chapters provide a fascinating overview of 5000 years of mathematics and its key cultures for academics in mathematics, historians of science, and general historians.

Mathematics for Machine Learning *Cambridge University Press*

The fundamental mathematical tools needed to understand machine learning include linear algebra, analytic geometry, matrix decompositions, vector calculus, optimization, probability and statistics. These topics are traditionally taught in disparate courses, making it hard for data science or computer science students, or professionals, to efficiently learn the mathematics. This self-contained textbook bridges the gap between mathematical and machine learning texts, introducing the mathematical concepts with a minimum of prerequisites. It uses these concepts to derive four central machine learning methods: linear regression, principal component analysis, Gaussian mixture models and support vector machines. For students and others with a mathematical background, these derivations provide a starting point to machine learning texts. For those learning the mathematics for the first time, the methods help build intuition and practical experience with applying mathematical concepts. Every chapter includes worked examples and exercises to test understanding. Programming tutorials are offered on the book's web site.

MYP Mathematics 1

A concept-based approach *Oxford University Press - Children*

Build solid mathematical understanding and develop meaningful conceptual connections. The inquiry-based approach holistically integrates the MYP key concepts, helping you shift to a concept-based approach and cement comprehension of mathematical principles. Fully comprehensive and matched to the Revised MYP, this resource builds student potential at MYP and lays foundations for cross-curricular understanding. Using a unique question cycle to sequentially build skills and comprehension, units introduce factual questions, followed by concept-based questions and conclude with debatable questions. This firm grounding in inquiry-based learning equips learners to actively explore mathematical concepts and relate them to the wider 21st Century world, strengthening comprehension. Progress your learners into IB Diploma - fully comprehensive and

matched to the Revised MYP Develop conceptual understanding in the best way for your learners - learn by mathematical unit or by key concept Drive active, critical ex

Visual Complex Analysis *Oxford University Press*

This radical approach to complex analysis replaces the standard calculational arguments with new geometric ones. Using several hundred diagrams this is a new visual approach to the topic.

A User's Guide to Thought and Meaning *OUP Oxford*

A User's Guide to Thought and Meaning presents a profound and arresting integration of the faculties of the mind - of how we think, speak, and see the world. Ray Jackendoff starts out by looking at languages and what the meanings of words and sentences actually do. He shows that meanings are more adaptive and complicated than they're commonly given credit for, and he is led to some basic questions: How do we perceive and act in the world? How do we talk about it? And how can the collection of neurons in the brain give rise to conscious experience? As it turns out, the organization of language, thought, and perception does not look much like the way we experience things, and only a small part of what the brain does is conscious. Jackendoff concludes that thought and meaning must be almost completely unconscious. What we experience as rational conscious thought - which we prize as setting us apart from the animals - in fact rides on a foundation of unconscious intuition. Rationality amounts to intuition enhanced by language. Written with an informality that belies both the originality of its insights and the radical nature of its conclusions, A User's Guide to Thought and Meaning is the author's most important book since the groundbreaking Foundations of Language in 2002.

Introduction to Algebra *Oxford University Press on Demand*

This Second Edition of a classic algebra text includes updated and comprehensive introductory chapters, new material on axiom of Choice, p-groups and local rings, discussion of theory and applications, and over 300 exercises. It is an ideal introductory text for all Year 1 and 2 undergraduate students in mathematics.

MYP Mathematics 2: Print and Online Course Book Pack *Ib Myp*

Build solid mathematical understanding and develop key conceptual connections. The inquiry-based approach integrates the MYP key concepts, helping you shift to a concept-based classroom and cement mathematical comprehension. Fully comprehensive and matched to the Revised MYP to support achievement. Progress your learners into IB Diploma - fully comprehensive and matched to the MYP Next Chapter curriculum Develop conceptual understanding in the best way for your learners - learn by mathematical unit or by key concept Drive active, critical exploration of mathematical principles - build rounded comprehension framed within the key and related concepts Develop meaningful cross-curricular connections that help learners recognize and manipulate mathematical ideas in other disciplines Support higher level thinking skills through an approach grounded in factual, conceptual and debatable questions Build a solid foundation of practical skills with extensive practice equipping learners to apply skills Fully prepare learners for the MYP

eAssessment Multiplatform access, compatible with a wide range of devices Your first login will be facilitated by a printed access card that will be sent to you in the mail Includes one print course book and one online course book

Handbook of Writing for the Mathematical Sciences *SIAM*

Nick Higham follows up his successful HWMS volume with this much-anticipated second edition.

The Oxford Handbook of Numerical Cognition *OUP Oxford*

How do we understand numbers? Do animals and babies have numerical abilities? Why do some people fail to grasp numbers, and how we can improve numerical understanding? Numbers are vital to so many areas of life: in science, economics, sports, education, and many aspects of everyday life from infancy onwards. Numerical cognition is a vibrant area that brings together scientists from different and diverse research areas (e.g., neuropsychology, cognitive psychology, developmental psychology, comparative psychology, anthropology, education, and neuroscience) using different methodological approaches (e.g., behavioral studies of healthy children and adults and of patients; electrophysiology and brain imaging studies in humans; single-cell neurophysiology in non-human primates, habituation studies in human infants and animals, and computer modeling). While the study of numerical cognition had been relatively neglected for a long time, during the last decade there has been an explosion of studies and new findings. This has resulted in an enormous advance in our understanding of the neural and cognitive mechanisms of numerical cognition. In addition, there has recently been increasing interest and concern about pupils' mathematical achievement in many countries, resulting in attempts to use research to guide mathematics instruction in schools, and to develop interventions for children with mathematical difficulties. This handbook brings together the different research areas that make up the field of numerical cognition in one comprehensive and authoritative volume. The chapters provide a broad and extensive review that is written in an accessible form for scholars and students, as well as educationalists, clinicians, and policy makers. The book covers the most important aspects of research on numerical cognition from the areas of development psychology, cognitive psychology, neuropsychology and rehabilitation, learning disabilities, human and animal cognition and neuroscience, computational modeling, education and individual differences, and philosophy. Containing more than 60 chapters by leading specialists in their fields, the Oxford Handbook of Numerical Cognition is a state-of-the-art review of the current literature.

The Concise Oxford Dictionary of Mathematics *OUP Oxford*

Authoritative and reliable, this A-Z provides jargon-free definitions for even the most technical mathematical terms. With over 3,000 entries ranging from Achilles paradox to zero matrix, it covers all commonly encountered terms and concepts from pure and applied mathematics and statistics, for example, linear algebra, optimisation, nonlinear equations, and differential equations. In addition, there are entries on major mathematicians and on topics of more general interest, such as fractals, game theory, and chaos. Using graphs, diagrams, and charts to render definitions as comprehensible as possible, entries are clear and accessible. Almost 200 new entries have been

added to this edition, including terms such as arrow paradox, nested set, and symbolic logic. Useful appendices follow the A-Z dictionary and include lists of Nobel Prize winners and Fields' medallists, Greek letters, formulae, and tables of inequalities, moments of inertia, Roman numerals, a geometry summary, additional trigonometric values of special angles, and many more. This edition contains recommended web links, which are accessible and kept up to date via the Dictionary of Mathematics companion website. Fully revised and updated in line with curriculum and degree requirements, this dictionary is indispensable for students and teachers of mathematics, and for anyone encountering mathematics in the workplace.

Princeton Companion to Applied Mathematics *Princeton University Press*

This is the most authoritative and accessible single-volume reference book on applied mathematics. Featuring numerous entries by leading experts and organized thematically, it introduces readers to applied mathematics and its uses; explains key concepts; describes important equations, laws, and functions; looks at exciting areas of research; covers modeling and simulation; explores areas of application; and more. Modeled on the popular Princeton Companion to Mathematics, this volume is an indispensable resource for undergraduate and graduate students, researchers, and practitioners in other disciplines seeking a user-friendly reference book on applied mathematics. Features nearly 200 entries organized thematically and written by an international team of distinguished contributors Presents the major ideas and branches of applied mathematics in a clear and accessible way Explains important mathematical concepts, methods, equations, and applications Introduces the language of applied mathematics and the goals of applied mathematical research Gives a wide range of examples of mathematical modeling Covers continuum mechanics, dynamical systems, numerical analysis, discrete and combinatorial mathematics, mathematical physics, and much more Explores the connections between applied mathematics and other disciplines Includes suggestions for further reading, cross-references, and a comprehensive index

Causation

A User's Guide *OUP Oxford*

Causation is at once familiar and mysterious. Many believe that the causal relation is not directly observable, but that we nevertheless can somehow detect its presence in the world. Common sense seems to have a firm grip on causation, and much work in the natural and social sciences relies on the idea. Yet neither common sense nor extensive philosophical debate has led us to anything like agreement on the correct analysis of the concept of causation, or an account of the metaphysical nature of the causal relation. Contemporary debates are driven by opposing motivations, conflicting intuitions, and unarticulated methodological assumptions. Causation: A User's Guide cuts a clear path through this confusing but vital landscape. L. A. Paul and Ned Hall guide the reader through the most important philosophical treatments of causation, negotiating the terrain by taking a set of examples as landmarks. Special attention is given to counterfactual and related analyses of causation. Using a methodological principle based on the close examination of potential counterexamples, they clarify the central themes of the debate about causation, and cover

questions about causation involving omissions or absences, preemption and other species of redundant causation, and the possibility that causation is not transitive. Along the way, Paul and Hall examine several contemporary proposals for analyzing the nature of causation and assess their merits and overall methodological cogency. The book is designed to be of value both to trained specialists and those coming to the problem of causation for the first time. It provides the reader with a broad and sophisticated view of the metaphysics of the causal relation.

Quantum Field Theory I: Basics in Mathematics and Physics

A Bridge between Mathematicians and Physicists *Springer Science & Business Media*

This is the first volume of a modern introduction to quantum field theory which addresses both mathematicians and physicists, at levels ranging from advanced undergraduate students to professional scientists. The book bridges the acknowledged gap between the different languages used by mathematicians and physicists. For students of mathematics the author shows that detailed knowledge of the physical background helps to motivate the mathematical subjects and to discover interesting interrelationships between quite different mathematical topics. For students of physics, fairly advanced mathematics is presented, which goes beyond the usual curriculum in physics.

LAPACK95 Users' Guide *SIAM*

LAPACK95 Users' Guide provides an introduction to the design of the LAPACK95 package.

The Oxford Handbook of Philosophy of Mathematics and Logic *OUP USA*

Covers the state of the art in the philosophy of maths and logic, giving the reader an overview of the major problems, positions, and battle lines. The chapters in this book contain both exposition and criticism as well as substantial development of their own positions. It also includes a bibliography.

Origins of Mathematical Words

A Comprehensive Dictionary of Latin, Greek, and Arabic Roots *JHU Press*

These and hundreds of other terms wait to be discovered within the pages of this mathematical and etymological treasure chest.

A Book of Set Theory *Courier Corporation*

"This accessible approach to set theory for upper-level undergraduates poses rigorous but simple arguments. Each definition is accompanied by commentary that motivates and explains new concepts. A historical introduction is followed by discussions of classes and sets, functions, natural and cardinal numbers, the arithmetic of ordinal numbers, and related topics. 1971 edition with new material by the author"--

The Princeton Companion to Mathematics *Princeton University Press*

This is a one-of-a-kind reference for anyone with a serious interest in mathematics. Edited by

Timothy Gowers, a recipient of the Fields Medal, it presents nearly two hundred entries, written especially for this book by some of the world's leading mathematicians, that introduce basic mathematical tools and vocabulary; trace the development of modern mathematics; explain essential terms and concepts; examine core ideas in major areas of mathematics; describe the achievements of scores of famous mathematicians; explore the impact of mathematics on other disciplines such as biology, finance, and music--and much, much more. Unparalleled in its depth of coverage, *The Princeton Companion to Mathematics* surveys the most active and exciting branches of pure mathematics. Accessible in style, this is an indispensable resource for undergraduate and graduate students in mathematics as well as for researchers and scholars seeking to understand areas outside their specialties. Features nearly 200 entries, organized thematically and written by an international team of distinguished contributors Presents major ideas and branches of pure mathematics in a clear, accessible style Defines and explains important mathematical concepts, methods, theorems, and open problems Introduces the language of mathematics and the goals of mathematical research Covers number theory, algebra, analysis, geometry, logic, probability, and more Traces the history and development of modern mathematics Profiles more than ninety-five mathematicians who influenced those working today Explores the influence of mathematics on other disciplines Includes bibliographies, cross-references, and a comprehensive index Contributors include: Graham Allan, Noga Alon, George Andrews, Tom Archibald, Sir Michael Atiyah, David Aubin, Joan Bagaria, Keith Ball, June Barrow-Green, Alan Beardon, David D. Ben-Zvi, Vitaly Bergelson, Nicholas Bingham, Béla Bollobás, Henk Bos, Bodil Branner, Martin R. Bridson, John P. Burgess, Kevin Buzzard, Peter J. Cameron, Jean-Luc Chabert, Eugenia Cheng, Clifford C. Cocks, Alain Connes, Leo Corry, Wolfgang Coy, Tony Crilly, Serafina Cuomo, Mihalis Dafermos, Partha Dasgupta, Ingrid Daubechies, Joseph W. Dauben, John W. Dawson Jr., Francois de Gandt, Persi Diaconis, Jordan S. Ellenberg, Lawrence C. Evans, Florence Fasanelli, Anita Burdman Feferman, Solomon Feferman, Charles Fefferman, Della Fenster, José Ferreirós, David Fisher, Terry Gannon, A. Gardiner, Charles C. Gillispie, Oded Goldreich, Catherine Goldstein, Fernando Q. Gouvêa, Timothy Gowers, Andrew Granville, Ivor Grattan-Guinness, Jeremy Gray, Ben Green, Ian Grojnowski, Niccolò Guicciardini, Michael Harris, Ulf Hashagen, Nigel Higson, Andrew Hodges, F. E. A. Johnson, Mark Joshi, Kiran S. Kedlaya, Frank Kelly, Sergiu Klainerman, Jon Kleinberg, Israel Kleiner, Jacek Klinowski, Eberhard Knobloch, János Kollár, T. W. Körner, Michael Krivelevich, Peter D. Lax, Imre Leader, Jean-François Le Gall, W. B. R. Lickorish, Martin W. Liebeck, Jesper Lützen, Des MacHale, Alan L. Mackay, Shahn Majid, Lech Maligranda, David Marker, Jean Mawhin, Barry Mazur, Dusa McDuff, Colin McLarty, Bojan Mohar, Peter M. Neumann, Catherine Nolan, James Norris, Brian Osserman, Richard S. Palais, Marco Panza, Karen Hunger Parshall, Gabriel P. Paternain, Jeanne Peiffer, Carl Pomerance, Helmut Pulte, Bruce Reed, Michael C. Reed, Adrian Rice, Eleanor Robson, Igor Rodnianski, John Roe, Mark Ronan, Edward Sandifer, Tilman Sauer, Norbert Schappacher, Andrzej Schinzel, Erhard Scholz, Reinhard Siegmund-Schultze, Gordon Slade, David J. Spiegelhalter, Jacqueline Stedall, Arild Stubhaug, Madhu Sudan, Terence Tao, Jamie Tappenden, C. H. Taubes, Rüdiger Thiele, Burt Totaro, Lloyd N. Trefethen, Dirk van Dalen, Richard Weber, Dominic Welsh, Avi Wigderson, Herbert Wilf, David Wilkins, B. Yandell, Eric Zaslow, Doron Zeilberger

Basic Algebra *Springer Science & Business Media*

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.

I Have a Photographic Memory *American Mathematical Soc.*

A Biologist's Guide to Mathematical Modeling in Ecology and Evolution *Princeton University Press*

Thirty years ago, biologists could get by with a rudimentary grasp of mathematics and modeling. Not so today. In seeking to answer fundamental questions about how biological systems function and change over time, the modern biologist is as likely to rely on sophisticated mathematical and computer-based models as traditional fieldwork. In this book, Sarah Otto and Troy Day provide biology students with the tools necessary to both interpret models and to build their own. The book starts at an elementary level of mathematical modeling, assuming that the reader has had high school mathematics and first-year calculus. Otto and Day then gradually build in depth and complexity, from classic models in ecology and evolution to more intricate class-structured and probabilistic models. The authors provide primers with instructive exercises to introduce readers to the more advanced subjects of linear algebra and probability theory. Through examples, they describe how models have been used to understand such topics as the spread of HIV, chaos, the age structure of a country, speciation, and extinction. Ecologists and evolutionary biologists today need enough mathematical training to be able to assess the power and limits of biological models and to develop theories and models themselves. This innovative book will be an indispensable guide to the world of mathematical models for the next generation of biologists. A how-to guide for developing new mathematical models in biology Provides step-by-step recipes for constructing and analyzing models Interesting biological applications Explores classical models in ecology and evolution Questions at the end of every chapter Primers cover important mathematical topics Exercises with answers Appendixes summarize useful rules Labs and advanced material available

The Turing Guide *Oxford University Press*

Alan Turing has long proved a subject of fascination, but following the centenary of his birth in 2012, the code-breaker, computer pioneer, mathematician (and much more) has become even more celebrated with much media coverage, and several meetings, conferences and books raising public awareness of Turing's life and work. This volume will bring together contributions from some of the leading experts on Alan Turing to create a comprehensive guide to Turing that will serve as a useful resource for researchers in the area as well as the increasingly interested general reader. The book will cover aspects of Turing's life and the wide range of his intellectual activities, including mathematics, code-breaking, computer science, logic, artificial intelligence and mathematical

biology, as well as his subsequent influence.

Fundamentals of Mathematics \

A User's Guide to Measure Theoretic Probability *Cambridge University Press*

This book grew from a one-semester course offered for many years to a mixed audience of graduate and undergraduate students who have not had the luxury of taking a course in measure theory. The core of the book covers the basic topics of independence, conditioning, martingales, convergence in distribution, and Fourier transforms. In addition there are numerous sections treating topics traditionally thought of as more advanced, such as coupling and the KMT strong approximation, option pricing via the equivalent martingale measure, and the isoperimetric inequality for Gaussian processes. The book is not just a presentation of mathematical theory, but is also a discussion of why that theory takes its current form. It will be a secure starting point for anyone who needs to invoke rigorous probabilistic arguments and understand what they mean.

Mathematical Writing *Cambridge University Press*

This book will help those wishing to teach a course in technical writing, or who wish to write themselves.

Handbook of Mathematics *Springer Science & Business Media*

This guide book to mathematics contains in handbook form the fundamental working knowledge of mathematics which is needed as an everyday guide for working scientists and engineers, as well as for students. Easy to understand, and convenient to use, this guide book gives concisely the information necessary to evaluate most problems which occur in concrete applications. For the 4th edition, the concept of the book has been completely re-arranged. The new emphasis is on those fields of mathematics that became more important for the formulation and modeling of technical and natural processes, namely Numerical Mathematics, Probability Theory and Statistics, as well as Information Processing.

Play = Learning

How Play Motivates and Enhances Children's Cognitive and Social-Emotional Growth

Oxford University Press

In Play=Learning, top experts in child development and learning contend that in over-emphasizing academic achievement, our culture has forgotten about the importance of play for children's development.

Discrete Mathematics

An Open Introduction

Note: This is the 3rd edition. If you need the 2nd edition for a course you are taking, it can be found

as a "other format" on amazon, or by searching its isbn: 1534970746 This gentle introduction to discrete mathematics is written for first and second year math majors, especially those who intend to teach. The text began as a set of lecture notes for the discrete mathematics course at the University of Northern Colorado. This course serves both as an introduction to topics in discrete math and as the "introduction to proof" course for math majors. The course is usually taught with a large amount of student inquiry, and this text is written to help facilitate this. Four main topics are covered: counting, sequences, logic, and graph theory. Along the way proofs are introduced, including proofs by contradiction, proofs by induction, and combinatorial proofs. The book contains over 470 exercises, including 275 with solutions and over 100 with hints. There are also Investigate! activities throughout the text to support active, inquiry based learning. While there are many fine discrete math textbooks available, this text has the following advantages: It is written to be used in an inquiry rich course. It is written to be used in a course for future math teachers. It is open source, with low cost print editions and free electronic editions. This third edition brings improved exposition, a new section on trees, and a bunch of new and improved exercises. For a complete list of changes, and to view the free electronic version of the text, visit the book's website at discrete.openmathbooks.org

Introduction to Applied Linear Algebra

Vectors, Matrices, and Least Squares *Cambridge University Press*

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

CRC Handbook of Lie Group Analysis of Differential Equations *CRC Press*

Today Lie group theoretical approach to differential equations has been extended to new situations and has become applicable to the majority of equations that frequently occur in applied sciences. Newly developed theoretical and computational methods are awaiting application. Students and applied scientists are expected to understand these methods. Volume 3 and the accompanying software allow readers to extend their knowledge of computational algebra. Written by the world's leading experts in the field, this up-to-date sourcebook covers topics such as Lie-Bäcklund, conditional and non-classical symmetries, approximate symmetry groups for equations with a small parameter, group analysis of differential equations with distributions, integro-differential equations, recursions, and symbolic software packages. The text provides an ideal introduction to modern group analysis and addresses issues to both beginners and experienced researchers in the application of Lie group methods.

Fractals: A Very Short Introduction *OUP Oxford*

Many are familiar with the beauty and ubiquity of fractal forms within nature. Unlike the study of smooth forms such as spheres, fractal geometry describes more familiar shapes and patterns, such as the complex contours of coastlines, the outlines of clouds, and the branching of trees. In this Very Short Introduction, Kenneth Falconer looks at the roots of the 'fractal revolution' that occurred in

mathematics in the 20th century, presents the 'new geometry' of fractals, explains the basic concepts, and explores the wide range of applications in science, and in aspects of economics. This is essential introductory reading for students of mathematics and science, and those interested in popular science and mathematics. ABOUT THE SERIES: The Very Short Introductions series from Oxford University Press contains hundreds of titles in almost every subject area. These pocket-sized books are the perfect way to get ahead in a new subject quickly. Our expert authors combine facts, analysis, perspective, new ideas, and enthusiasm to make interesting and challenging topics highly readable.

Taking Sudoku Seriously

The Math Behind the World's Most Popular Pencil Puzzle *Oxford University Press*

Packed with more than a hundred color illustrations and a wide variety of puzzles and brainteasers, Taking Sudoku Seriously uses this popular craze as the starting point for a fun-filled introduction to higher mathematics. How many Sudoku solution squares are there? What shapes other than three-by-three blocks can serve as acceptable Sudoku regions? What is the fewest number of starting clues a sound Sudoku puzzle can have? Does solving Sudoku require mathematics? Jason Rosenhouse and Laura Taalman show that answering these questions opens the door to a wealth of interesting mathematics. Indeed, they show that Sudoku puzzles and their variants are a gateway into mathematical thinking generally. Among many topics, the authors look at the notion of a Latin square--an object of long-standing interest to mathematicians--of which Sudoku squares are a special case; discuss how one finds interesting Sudoku puzzles; explore the connections between Sudoku, graph theory, and polynomials; and consider Sudoku extremes, including puzzles with the maximal number of vacant regions, with the minimal number of starting clues, and numerous others. The book concludes with a gallery of novel Sudoku variations--just pure solving fun! Most of the puzzles are original to this volume, and all solutions to the puzzles appear in the back of the book or in the text itself. A math book and a puzzle book, Taking Sudoku Seriously will change the way readers look at Sudoku and mathematics, serving both as an introduction to mathematics for puzzle fans and as an exploration of the intricacies of Sudoku for mathematics buffs.

Technology and the Virtues

A Philosophical Guide to a Future Worth Wanting *Oxford University Press*

The 21st century offers a dizzying array of new technological developments: robots smart enough to take white collar jobs, social media tools that manage our most important relationships, ordinary objects that track, record, analyze and share every detail of our daily lives, and biomedical techniques with the potential to transform and enhance human minds and bodies to an unprecedented degree. Emerging technologies are reshaping our habits, practices, institutions, cultures and environments in increasingly rapid, complex and unpredictable ways that create profound risks and opportunities for human flourishing on a global scale. How can our future be protected in such challenging and uncertain conditions? How can we possibly improve the chances

that the human family will not only live, but live well, into the 21st century and beyond? This book locates a key to that future in the distant past: specifically, in the philosophical traditions of virtue ethics developed by classical thinkers from Aristotle and Confucius to the Buddha. Each developed a way of seeking the good life that equips human beings with the moral and intellectual character to flourish even in the most unpredictable, complex and unstable situations--precisely where we find ourselves today. Through an examination of the many risks and opportunities presented by rapidly changing technosocial conditions, Vallor makes the case that if we are to have any real hope of securing a future worth wanting, then we will need more than just better technologies. We will also need better humans. Technology and the Virtues develops a practical framework for seeking that goal by means of the deliberate cultivation of technomoral virtues: specific skills and strengths of character, adapted to the unique challenges of 21st century life, that offer the human family our best chance of learning to live wisely and well with emerging technologies.

Quantum Field Theory III: Gauge Theory

A Bridge between Mathematicians and Physicists *Springer Science & Business Media*

In this third volume of his modern introduction to quantum field theory, Eberhard Zeidler examines the mathematical and physical aspects of gauge theory as a principle tool for describing the four fundamental forces which act in the universe: gravitative, electromagnetic, weak interaction and strong interaction. Volume III concentrates on the classical aspects of gauge theory, describing the four fundamental forces by the curvature of appropriate fiber bundles. This must be supplemented by the crucial, but elusive quantization procedure. The book is arranged in four sections, devoted to realizing the universal principle force equals curvature: Part I: The Euclidean Manifold as a Paradigm Part II: Ariadne's Thread in Gauge Theory Part III: Einstein's Theory of Special Relativity Part IV: Ariadne's Thread in Cohomology For students of mathematics the book is designed to demonstrate that detailed knowledge of the physical background helps to reveal interesting interrelationships among diverse mathematical topics. Physics students will be exposed to a fairly advanced mathematics, beyond the level covered in the typical physics curriculum. Quantum Field Theory builds a bridge between mathematicians and physicists, based on challenging questions about the fundamental forces in the universe (macrocosmos), and in the world of elementary particles (microcosmos).

Quantum Field Theory II: Quantum Electrodynamics

A Bridge between Mathematicians and Physicists *Springer Science & Business Media*

And God said, Let there be light; and there was light. Genesis 1,3 Light is not only the basis of our biological existence, but also an essential source of our knowledge about the physical laws of nature, ranging from the seventeenth century geometrical optics up to the twentieth century theory of general relativity and quantum electrodynamics. Folklore Don't give us numbers: give us insight! A contemporary natural scientist to a mathematician The present book is the second volume of a comprehensive introduction to

the mathematical and physical aspects of modern quantum field theory which comprehends the following six volumes: Volume I: Basics in Mathematics and Physics Volume II: Quantum Electrodynamics Volume III: Gauge Theory Volume IV: Quantum Mathematics Volume V: The Physics of the Standard Model Volume VI: Quantum Gravitation and String Theory. It is our goal to build a bridge between mathematicians and physicists based on the challenging question about the fundamental forces in • macrocosmos (the universe) and • microcosmos (the world of elementary particles). The six volumes address a broad audience of readers, including both undergraduate and graduate students, as well as experienced scientists who want to become familiar with quantum field theory, which is a fascinating topic in modern mathematics and physics.

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