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Foundations of the Logical Theory of Scientific Knowledge (Complex Logic) A.A. Zinov'ev 2012-12-06 Boston Studies in the Philosophy of Science are devoted to symposia, con gresses, colloquia, monographs and collected papers on the philosophical foundations of the sciences. It is now our pleasure to include A. A. Zi nov'ev's treatise on complex logic among these volumes. Zinov'ev is one of the most creative of modern Soviet logicians, and at the same time an innovative worker on the methodological foundations of science. More over, Zinov'ev, although still a developing scholar, has exerted a sub stantial and stimulating influence upon his colleagues and students in Moscow and within other philosophical and logical circles of the Soviet Union. Hence it may be helpful, in bringing this present work to an English-reading audience, to review briefly some contemporary Soviet investigations into scientific methodology. During the 1950's, a vigorous new research program in logic was under taken, and the initial published work -characteristic of most Soviet pub lications in the logic and methodology of the sciences - was a collection of essays, Logical Investigations (Moscow, 1959). Among the authors, in addition to Zinov'ev himself, were the philosophers A. Kol'man and P. V. Tavanec, and the mathematicians and linguists, S. A. Janovskaja, A. S. Esenin-Vol'pin, S. K. Saumjan, G. N. Povarov.

Bayesian Probability Theory Wolfgang von der Linden 2014-06-12 Covering all aspects of probability theory, statistics and data analysis from a Bayesian perspective for graduate students and researchers.

Evidence and Evolution Elliott Sober 2008-03-27 How should the concept of evidence be understood? And how does the concept of evidence apply to the controversy about creationism as well as to work in evolutionary biology about natural selection and common ancestry? In this rich and wide-ranging book, Elliott Sober investigates general questions about probability and evidence and shows how the answers he develops to those questions apply to the specifics of evolutionary biology. Drawing on a set of fascinating examples, he analyzes whether claims about intelligent design are untestable; whether they are discredited by the fact that many adaptations are imperfect; how evidence bears on whether present species trace back to common ancestors; how hypotheses about natural selection can be tested, and many other issues. His book will interest all readers who want to understand philosophical questions about evidence and evolution, as they arise both in Darwin's work and in contemporary biological research.

Probability, Statistics, and Truth Richard Von Mises 1957 This comprehensive study of probability considers the approaches of Pascal, Laplace, Poisson, and others. It also discusses Laws of Large Numbers, the theory of errors, and other relevant topics.

The Science of Conjecture James Franklin 2001 "A magisterial acount of matters as diverse as the Talmud, Justinian's Digest, torture, witch hunts, Tudor treason trials, ancient and medieval astronomy and physics, humanist historiography, scholastic philosophy, speculations in public debt, and 17th century mathematics." -- International Journal of Evidence and Proof

Introduction to Probability Models Sheldon M. Ross 2006-12-11 Introduction to Probability Models, Tenth Edition, provides an introduction to elementary probability theory and stochastic processes. There are two approaches to the study of probability theory. One is heuristic and nonrigorous, and attempts to develop in students an intuitive feel for the subject that enables him or her to think probabilistically. The other approach attempts a rigorous development of probability by using the tools of measure theory. The first approach is employed in this text. The book begins by introducing basic concepts of probability theory, such as the random variable, conditional probability, and conditional expectation. This is followed by discussions of stochastic processes, including Markov chains and Poison processes. The remaining chapters cover queuing, reliability theory, Brownian motion, and simulation. Many examples are worked out throughout the text, along with exercises to be solved by students. This book will be particularly useful to those interested in learning how probability theory can be applied to the study of phenomena in fields such as engineering, computer science, management science, the physical and social sciences, and operations research. Ideally, this text would be used in a one-year course in probability models, or a one-semester course in introductory probability theory or a course in elementary stochastic processes. New to this Edition: 65% new chapter material including coverage of finite capacity queues, insurance risk models and Markov chains Contains compulsory material for new Exam 3 of the Society of Actuaries containing several sections in the new exams Updated data, and a list of commonly used notations and equations, a robust ancillary package, including a ISM, SSM, and test bank Includes SPSS PASW Modeler and SAS JMP software packages which are widely used in the field Hallmark features: Superior writing style Excellent exercises and examples covering the wide breadth of coverage of probability topics Real-world applications in engineering, science, business and economics

Logic, Language, and Probability International Congress for Logic, Methodology, and P 1973-06-30 A Selection of Papers Contributed to Sections IV, VI, and XI of the Fourth International Congress for Logic, Methodology, and Philosophy of Science, Bucharest, September 1971

Mathematical Methods of Statistics Harald Cramér 1999

Fuzzy Logic in Geology Robert V. Demicco 2003-10-20 What is fuzzy logic?--a system of concepts and methods for exploring modes of reasoning that are approximate rather than exact. While the engineering community has appreciated the advances in understanding using fuzzy logic for quite some time, fuzzy logic's impact in non-engineering disciplines is only now being recognized. The authors of Fuzzy Logic in Geology attend to this growing interest in the subject and introduce the use of fuzzy set theory in a style geoscientists can

understand. This is followed by individual chapters on topics relevant to earth scientists: sediment modeling, fracture detection, reservoir characterization, clustering in geophysical data analysis, ground water movement, and time series analysis. George Klir is the Distinguished Professor of Systems Science and Director of the Center for Intelligent Systems, Fellow of the IEEE and IFSA, editor of nine volumes, editorial board member of 18 journals, and author or co-author of 16 books Foreword by the inventor of fuzzy logic--Professor Lotfi Zadeh

Bernoulli's Fallacy Aubrey Clayton 2021-08-03 There is a logical flaw in the statistical methods used across experimental science. This fault is not a minor academic quibble: it underlies a reproducibility crisis now threatening entire disciplines. In an increasingly statistics-reliant society, this same deeply rooted error shapes decisions in medicine, law, and public policy with profound consequences. The foundation of the problem is a misunderstanding of probability and its role in making inferences from observations. Aubrey Clayton traces the history of how statistics went astray, beginning with the groundbreaking work of the seventeenth-century mathematician Jacob Bernoulli and winding through gambling, astronomy, and genetics. Clayton recounts the feuds among rival schools of statistics, exploring the surprisingly human problems that gave rise to the discipline and the all-too-human shortcomings that derailed it. He highlights how influential nineteenth- and twentieth-century figures developed a statistical methodology they claimed was purely objective in order to silence critics of their political agendas, including eugenics. Clayton provides a clear account of the mathematics and logic of probability, conveying complex concepts accessibly for readers interested in the statistical methods that frame our understanding of the world. He contends that we need to take a Bayesian approach—that is, to incorporate prior knowledge when reasoning with incomplete information—in order to resolve the crisis. Ranging across math, philosophy, and culture, Bernoulli’s Fallacy explains why something has gone wrong with how we use data—and how to fix it.

Foundations of Bayesianism D. Corfield 2013-03-14 This is an authoritative collection of papers addressing the key challenges that face the Bayesian interpretation of probability today. The volume includes important criticisms of Bayesian reasoning and gives an insight into some of the points of disagreement amongst advocates of the Bayesian approach. It will be of interest to graduate students, researchers, those involved with the applications of Bayesian reasoning, and philosophers.

Introduction to Probability Charles Miller Grinstead 2012-10 This text is designed for an introductory probability course at the university level for sophomores, juniors, and seniors in mathematics, physical and social sciences, engineering, and computer science. It presents a thorough treatment of ideas and techniques necessary for a firm understanding of the subject. The text is also recommended for use in discrete probability courses. The material is organized so that the discrete and continuous probability discussions are presented in a separate, but parallel, manner. This organization does not emphasize an overly rigorous or formal view of probability and therefore offers some strong pedagogical value. Hence, the discrete discussions can sometimes serve to motivate the more abstract continuous probability discussions. Features: Key ideas are developed in a somewhat leisurely style, providing a variety of interesting applications to probability and showing some nonintuitive ideas. Over 600 exercises provide the opportunity for practicing skills and developing a sound understanding of ideas. Numerous historical comments deal with the development of discrete

probability. The text includes many computer programs that illustrate the algorithms or the methods of computation for important problems. The book is a beautiful introduction to probability theory at the beginning level. The book contains a lot of examples and an easy development of theory without any sacrifice of rigor, keeping the abstraction to a minimal level. It is indeed a valuable addition to the study of probability theory. --Zentralblatt MATH

All of Statistics Larry Wasserman 2013-12-11 Taken literally, the title "All of Statistics" is an exaggeration. But in spirit, the title is apt, as the book does cover a much broader range of topics than a typical introductory book on mathematical statistics. This book is for people who want to learn probability and statistics quickly. It is suitable for graduate or advanced undergraduate students in computer science, mathematics, statistics, and related disciplines. The book includes modern topics like non-parametric curve estimation, bootstrapping, and classification, topics that are usually relegated to follow-up courses. The reader is presumed to know calculus and a little linear algebra. No previous knowledge of probability and statistics is required. Statistics, data mining, and machine learning are all concerned with collecting and analysing data.

Probabilistic Logics and Probabilistic Networks Rolf Haenni 2010-11-19 While probabilistic logics in principle might be applied to solve a range of problems, in practice they are rarely applied - perhaps because they seem disparate, complicated, and computationally intractable. This programmatic book argues that several approaches to probabilistic logic fit into a simple unifying framework in which logically complex evidence is used to associate probability intervals or probabilities with sentences. Specifically, Part I shows that there is a natural way to present a question posed in probabilistic logic, and that various inferential procedures provide semantics for that question, while Part II shows that there is the potential to develop computationally feasible methods to mesh with this framework. The book is intended for researchers in philosophy, logic, computer science and statistics. A familiarity with mathematical concepts and notation is presumed, but no advanced knowledge of logic or probability theory is required.

Foundations of Constructive Probability Theory Yuen-Kwok Chan 2021-05-27 This book provides a systematic and general theory of probability within the framework of constructive mathematics.

Uncertainty William Briggs 2016-07-15 This book presents a philosophical approach to probability and probabilistic thinking, considering the underpinnings of probabilistic reasoning and modeling, which effectively underlie everything in data science. The ultimate goal is to call into question many standard tenets and lay the philosophical and probabilistic groundwork and infrastructure for statistical modeling. It is the first book devoted to the philosophy of data aimed at working scientists and calls for a new consideration in the practice of probability and statistics to eliminate what has been referred to as the "Cult of Statistical Significance." The book explains the philosophy of these ideas and not the mathematics, though there are a handful of mathematical examples. The topics are logically laid out, starting with basic philosophy as related to probability, statistics, and science, and stepping through the key probabilistic ideas and concepts, and ending with statistical models. Its jargon-free approach asserts that standard methods, such as out-of-the-box regression, cannot help in discovering cause. This new way of looking at uncertainty ties together disparate fields — probability, physics, biology, the “soft” sciences, computer science —

because each aims at discovering cause (of effects). It broadens the understanding beyond frequentist and Bayesian methods to propose a Third Way of modeling.

A Logical Introduction to Probability and Induction Franz Huber 2018-12-19 A Logical Introduction to Probability and Induction is a textbook on the mathematics of the probability calculus and its applications in philosophy. On the mathematical side, the textbook introduces these parts of logic and set theory that are needed for a precise formulation of the probability calculus. On the philosophical side, the main focus is on the problem of induction and its reception in epistemology and the philosophy of science. Particular emphasis is placed on the means-end approach to the justification of inductive inference rules. In addition, the book discusses the major interpretations of probability. These are philosophical accounts of the nature of probability that interpret the mathematical structure of the probability calculus. Besides the classical and logical interpretation, they include the interpretation of probability as chance, degree of belief, and relative frequency. The Bayesian interpretation of probability as degree of belief locates probability in a subject's mind. It raises the question why her degrees of belief ought to obey the probability calculus. In contrast to this, chance and relative frequency belong to the external world. While chance is postulated by theory, relative frequencies can be observed empirically. A Logical Introduction to Probability and Induction aims to equip students with the ability to successfully carry out arguments. It begins with elementary deductive logic and uses it as basis for the material on probability and induction. Throughout the textbook results are carefully proved using the inference rules introduced at the beginning, and students are asked to solve problems in the form of 50 exercises. An instructor's manual contains the solutions to these exercises as well as suggested exam questions. The book does not presuppose any background in mathematics, although sections 10.3-10.9 on statistics are technically sophisticated and optional. The textbook is suitable for lower level undergraduate courses in philosophy and logic.

Boole's Logic and Probability T. Hailperin 1986-10-01 Since the publication of the first edition in 1976, there has been a notable increase of interest in the development of logic. This is evidenced by the several conferences on the history of logic, by a journal devoted to the subject, and by an accumulation of new results. This increased activity and the new results - the chief one being that Boole's work in probability is best viewed as a probability logic - were influential circumstances conducive to a new edition. Chapter 1, presenting Boole's ideas on a mathematical treatment of logic, from their emergence in his early 1847 work on through to his immediate successors, has been considerably enlarged. Chapter 2 includes additional discussion of the ``uninterpretable'' notion, both semantically and syntactically. Chapter 3 now includes a revival of Boole's abandoned propositional logic and, also, a discussion of his hitherto unnoticed brush with ancient formal logic. Chapter 5 has an improved explanation of why Boole's probability method works. Chapter 6, Applications and Probability Logic, is a new addition. Changes from the first edition have brought about a three-fold increase in the bibliography.

Understanding Probability Henk Tijms 2012-06-14 Understanding Probability is a unique and stimulating approach to a first course in probability. The first part of the book demystifies probability and uses many wonderful probability applications from everyday life to help the reader develop a feel for probabilities. The second part, covering a wide range of topics, teaches clearly and simply the basics of probability. This fully revised third edition has been packed with even more exercises and examples and it includes new sections on

Bayesian inference, Markov chain Monte-Carlo simulation, hitting probabilities in random walks and Brownian motion, and a new chapter on continuous-time Markov chains with applications. Here you will find all the material taught in an introductory probability course. The first part of the book, with its easy-going style, can be read by anybody with a reasonable background in high school mathematics. The second part of the book requires a basic course in calculus.

Foundations of Probability Theory, Statistical Inference, and Statistical Theories of Science W.L. Harper 1975-12-31 In May of 1973 we organized an international research colloquium on foundations of probability, statistics, and statistical theories of science at the University of Western Ontario. During the past four decades there have been striking formal advances in our understanding of logic, semantics and algebraic structure in probabilistic and statistical theories. These advances, which include the development of the relations between semantics and metamathematics, between logics and algebras and the algebraic-geometrical foundations of statistical theories (especially in the sciences), have led to striking new insights into the formal and conceptual structure of probability and statistical theory and their scientific applications in the form of scientific theory. The foundations of statistics are in a state of profound conflict. Fisher's objections to some aspects of Neyman-Pearson statistics have long been well known. More recently the emergence of Baysian statistics as a radical alternative to standard views has made the conflict especially acute. In recent years the response of many practising statisticians to the conflict has been an eclectic approach to statistical inference. Many good statisticians have developed a kind of wisdom which enables them to know which problems are most appropriately handled by each of the methods available. The search for principles which would explain why each of the methods works where it does and fails where it does offers a fruitful approach to the controversy over foundations.

Philosophical Theories of Probability Donald Gillies 2012-09-10 The Twentieth Century has seen a dramatic rise in the use of probability and statistics in almost all fields of research. This has stimulated many new philosophical ideas on probability. Philosophical Theories of Probability is the first book to present a clear, comprehensive and systematic account of these various theories and to explain how they relate to one another. Gillies also offers a distinctive version of the propensity theory of probability, and the intersubjective interpretation, which develops the subjective theory.

Probability Theory E. T. Jaynes 2003-04-10 index

High-Dimensional Probability Roman Vershynin 2018-09-27 An integrated package of powerful probabilistic tools and key applications in modern mathematical data science.

Theories of Probability Louis Narens 2007 Standard probability theory has been an enormously successful contribution to modern science. However, from many perspectives it is too narrow as a general theory of uncertainty, particularly for issues involving subjective uncertainty. This first-of-its-kind book is primarily based on qualitative approaches to probabilistic-like uncertainty, and includes qualitative theories for the standard theory as well as several of its generalizations.One of these generalizations produces a belief function composed of two functions: a probability function that measures the probabilistic strength of an uncertain event, and another function that measures the amount of ambiguity or

vagueness of the event. Another unique approach of the book is to change the event space from a boolean algebra, which is closely linked to classical propositional logic, to a different event algebra that is closely linked to a well-studied generalization of classical propositional logic known as intuitionistic logic. Together, these new qualitative theories succeed where the standard probability theory fails by accounting for a number of puzzling empirical findings in the psychology of human probability judgments and decision making.

Studies in Logic and Probability George Boole 2012-06 Authoritative account of the development of Boole's ideas in logic and probability theory ranges from The Mathematical Analysis of Logic to the end of his career. The Laws of Thought formed the most systematic statement of Boole's theories; this volume contains incomplete studies intended for a follow-up volume. 1952 edition.

An Objective Theory of Probability (Routledge Revivals) Donald Gillies 2012-07-26 This reissue of D. A. Gillies highly influential work, first published in 1973, is a philosophical theory of probability which seeks to develop von Mises' views on the subject. In agreement with von Mises, the author regards probability theory as a mathematical science like mechanics or electrodynamics, and probability as an objective, measurable concept like force, mass or charge. On the other hand, Dr Gillies rejects von Mises' definition of probability in terms of limiting frequency and claims that probability should be taken as a primitive or undefined term in accordance with modern axiomatic approaches. This of course raises the problem of how the abstract calculus of probability should be connected with the 'actual world of experiments'. It is suggested that this link should be established, not by a definition of probability, but by an application of Popper's concept of falsifiability. In addition to formulating his own interesting theory, Dr Gillies gives a detailed criticism of the generally accepted Neyman Pearson theory of testing, as well as of alternative philosophical approaches to probability theory. The reissue will be of interest both to philosophers with no previous knowledge of probability theory and to mathematicians interested in the foundations of probability theory and statistics.

Bayesian Logical Data Analysis for the Physical Sciences Phil Gregory 2005-04-14 Bayesian inference provides a simple and unified approach to data analysis, allowing experimenters to assign probabilities to competing hypotheses of interest, on the basis of the current state of knowledge. By incorporating relevant prior information, it can sometimes improve model parameter estimates by many orders of magnitude. This book provides a clear exposition of the underlying concepts with many worked examples and problem sets. It also discusses implementation, including an introduction to Markov chain Monte-Carlo integration and linear and nonlinear model fitting. Particularly extensive coverage of spectral analysis (detecting and measuring periodic signals) includes a self-contained introduction to Fourier and discrete Fourier methods. There is a chapter devoted to Bayesian inference with Poisson sampling, and three chapters on frequentist methods help to bridge the gap between the frequentist and Bayesian approaches. Supporting Mathematica® notebooks with solutions to selected problems, additional worked examples, and a Mathematica tutorial are available at www.cambridge.org/9780521150125.

Quantum, Probability, Logic Meir Hemmo 2020-04-07 This volume provides a broad perspective on the state of the art in the philosophy and conceptual foundations of quantum mechanics. Its essays take their starting point in the work and influence of Itamar Pitowsky,

who has greatly influenced our understanding of what is characteristically non-classical about quantum probabilities and quantum logic, and this serves as a vantage point from which they reflect on key ongoing debates in the field. Readers will find a definitive and multi-faceted description of the major open questions in the foundations of quantum mechanics today, including: Is quantum mechanics a new theory of (contextual) probability? Should the quantum state be interpreted objectively or subjectively? How should probability be understood in the Everett interpretation of quantum mechanics? What are the limits of the physical implementation of computation? The impact of this volume goes beyond the exposition of Pitowsky's influence: it provides a unique collection of essays by leading thinkers containing profound reflections on the field. Chapter 1. Classical logic, classical probability, and quantum mechanics (Samson Abramsky) Chapter 2. Why Scientific Realists Should Reject the Second Dogma of Quantum Mechanic (Valia Allori) Chapter 3. Unscrambling Subjective and Epistemic Probabilities (Guido Bacciagaluppi) Chapter 4. Wigner's Friend as a Rational Agent (Veronika Baumann, Časlav Brukner) Chapter 5. Pitowsky's Epistemic Interpretation of Quantum Mechanics and the PBR Theorem (Yemima Ben-Menahem) Chapter 6. On the Mathematical Constitution and Explanation of Physical Facts (Joseph Berkovitz) Chapter 7. Everettian probabilities, the Deutsch-Wallace theorem and the Principal Principle (Harvey R. Brown, Gal Ben Porath) Chapter 8. 'Two Dogmas' Redu (Jeffrey Bub) Chapter 9. Physical Computability Theses (B. Jack Copeland, Oron Shagrir) Chapter 10. Agents in Healey's Pragmatist Quantum Theory: A Comparison with Pitowsky's Approach to Quantum Mechanics (Mauro Dorato) Chapter 11. Quantum Mechanics As a Theory of Observables and States and, Thereby, As a Theory of Probability (John Earman, Laura Ruetsche) Chapter 12. The Measurement Problem and two Dogmas about Quantum Mechanic (Laura Felline) Chapter 13. There Is More Than One Way to Skin a Cat: Quantum Information Principles In a Finite World(Amit Hagar) Chapter 14. Is Quantum Mechanics a New Theory of Probability? (Richard Healey) Chapter 15. Quantum Mechanics as a Theory of Probability (Meir Hemmo, Orly Shenker) Chapter 16. On the Three Types of Bell's Inequalities (Gábor Hofer-Szabó) Chapter 17. On the Descriptive Power of Probability Logic (Ehud Hrushovski) Chapter 18. The Argument against Quantum Computers (Gil Kalai) Chapter 19. Why a Relativistic Quantum Mechanical World Must be Indeterministic (Avi Levy, Meir Hemmo) Chapter 20. Subjectivists about Quantum Probabilities Should be Realists about Quantum States (Wayne C. Myrvold) Chapter 21. The Relativistic Einstein-Podolsky-Rosen Argument (Michael Redhead) Chapter 22. What price statistical independence? How Einstein missed the photon.(Simon Saunders) Chapter 23. How (Maximally) Contextual is Quantum Mechanics? (Andrew W. Simmons) Chapter 24. Roots and (Re)Sources of Value (In)Definiteness Versus Contextuality (Karl Svozil) Chapter 25: Schrödinger's Reaction to the EPR Paper (Jos Uffink) Chapter 26. Derivations of the Born Rule (Lev Vaidman) Chapter 27. Dynamical States and the Conventionality of (Non-) Classicality (Alexander Wilce).

Mathematics for Machine Learning Marc Peter Deisenroth 2020-04-23 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.

Logic and General Theory of Science Edmund Husserl 2019-10-01 The stated subject of these lecture courses given by Husserlbetween 1910 and 1918is ‘reason, the word for the mental activities and accomplishments that govern knowledge, give it form and supply it with norms.’ They show their author still pursuing the course set out in the Logical Investigations up to the end of the second decade of the century and displaying utter consistency with stands that he began taking on meaning, analyticity, Platonism, manifolds, mathematics, psychologism, etc. in the 1890s. Thus, they undermine many idées reçues about the development of his thought. The centerpiece of this work is an exploration of the realm of meaning. Moreover, they add new dimensions to standard discussions by taking readers back to the place where phenomenology and analytic philosophy diverged. They show that Husserl tangled long and hard with the very ideas that went into the making of the latter and offer a wealth of interesting insights into sense and meaning, theory of judgment, complete and incomplete meanings, states of affairs, extensional logic, the relationship between logic and mathematics, functions and arguments, propositional functions, quantification, existential generalization, the word ‘all,’ number theory, sets, modality, deductive theory, ideas that are still under discussion today. Prepared for oral delivery in the classroom, they are refreshingly lively and spontaneous. They are clearer, more explicit, and readable than the books Husserl published during his lifetime.

E.T. Jaynes Edwin T. Jaynes 1989-04-30 The first six chapters of this volume present the author's 'predictive' or information theoretic' approach to statistical mechanics, in which the basic probability distributions over microstates are obtained as distributions of maximum entropy (Le. , as distributions that are most non-committal with regard to missing information among all those satisfying the macroscopically given constraints). There is then no need to make additional assumptions of ergodicity or metric transitivity; the theory proceeds entirely by inference from macroscopic measurements and the underlying dynamical assumptions. Moreover, the method of maximizing the entropy is completely general and applies, in particular, to irreversible processes as well as to reversible ones. The next three chapters provide a broader framework - at once Bayesian and objective - for maximum entropy inference. The basic principles of inference, including the usual axioms of probability, are seen to rest on nothing more than requirements of consistency, above all, the requirement that in two problems where we have the same information we must assign the same probabilities. Thus, statistical mechanics is viewed as a branch of a general theory of inference, and the latter as an extension of the ordinary logic of consistency. Those who are familiar with the literature of statistics and statistical mechanics will recognize in both of these steps a genuine 'scientific revolution' - a complete reversal of earlier conceptions - and one of no small significance.

Mathematics of the 19th Century A.N. Kolmogorov 2001-03 This multi-authored effort, Mathematics of the nineteenth century (to be fol lowed by Mathematics of the twentieth century), is a sequel to the History of mathematics from antiquity to the early nineteenth

century, published in three volumes from 1970 to 1972. 1 For reasons explained below, our discussion of twentieth-century mathematics ends with the 1930s. Our general objectives are identical with those stated in the preface to the three-volume edition, i. e. , we consider the development of mathematics not simply as the process of perfecting concepts and techniques for studying real-world spatial forms and quantitative relationships but as a social process as well. Mathematical structures, once established, are capable of a certain degree of autonomous development. In the final analysis, however, such immanent mathematical evolution is conditioned by practical activity and is either self-directed or, as is most often the case, is determined by the needs of society. Proceeding from this premise, we intend, first, to unravel the forces that shape mathe matical progress. We examine the interaction of mathematics with the social structure, technology, the natural sciences, and philosophy. Through an anal ysis of mathematical history proper, we hope to delineate the relationships among the various mathematical disciplines and to evaluate mathematical achievements in the light of the current state and future prospects of the science. The difficulties confronting us considerably exceeded those encountered in preparing the three-volume edition.

Foundations of Probability Theory, Statistical Inference, and Statistical Theories of Science William Harper 1975-12-31 In May of 1973 we organized an international research colloquium on foundations of probability, statistics, and statistical theories of science at the University of Western Ontario. During the past four decades there have been striking formal advances in our understanding of logic, semantics and algebraic structure in probabilistic and statistical theories. These advances, which include the development of the relations between semantics and metamathematics, between logics and algebras and the algebraic-geometrical foundations of statistical theories (especially in the sciences), have led to striking new insights into the formal and conceptual structure of probability and statistical theory and their scientific applications in the form of scientific theory. The foundations of statistics are in a state of profound conflict. Fisher's objections to some aspects of Neyman-Pearson statistics have long been well known. More recently the emergence of Bayesian statistics as a radical alternative to standard views has made the conflict especially acute. In recent years the response of many practising statisticians to the conflict has been an eclectic approach to statistical inference. Many good statisticians have developed a kind of wisdom which enables them to know which problems are most appropriately handled by each of the methods available. The search for principles which would explain why each of the methods works where it does and fails where it does offers a fruitful approach to the controversy over foundations.

Probability Theory Valeriĭ Borisovich Nevzorov 2021 This book is written for people who are interested to know the basics of probability theory. The basic knowledge of high school math will be enough to know the probability theory covered in the book. It covers basic theories of probability, statistical distributions, order statistics and record values, The use of characterization methods are described to identify various probability distributions. The book will be useful for undergraduate, graduate students and applied statisticians.

Probability and Stochastics Erhan Çınlar 2011-02-21 This text is an introduction to the modern theory and applications of probability and stochastics. The style and coverage is geared towards the theory of stochastic processes, but with some attention to the applications. In many instances the gist of the problem is introduced in practical, everyday language and then is made precise in mathematical form. The first four chapters are on

probability theory: measure and integration, probability spaces, conditional expectations, and the classical limit theorems. There follows chapters on martingales, Poisson random measures, Levy Processes, Brownian motion, and Markov Processes. Special attention is paid to Poisson random measures and their roles in regulating the excursions of Brownian motion and the jumps of Levy and Markov processes. Each chapter has a large number of varied examples and exercises. The book is based on the author's lecture notes in courses offered over the years at Princeton University. These courses attracted graduate students from engineering, economics, physics, computer sciences, and mathematics. Erhan Cinlar has received many awards for excellence in teaching, including the President's Award for Distinguished Teaching at Princeton University. His research interests include theories of Markov processes, point processes, stochastic calculus, and stochastic flows. The book is full of insights and observations that only a lifetime researcher in probability can have, all told in a lucid yet precise style.

The Theory of Probability Harold Jeffreys 1998-08-06 Another title in the reissued Oxford Classic Texts in the Physical Sciences series, Jeffrey's Theory of Probability, first published in 1939, was the first to develop a fundamental theory of scientific inference based on the ideas of Bayesian statistics. His ideas were way ahead of their time and it is only in the past ten years that the subject of Bayes' factors has been significantly developed and extended. Until recently the two schools of statistics (Bayesian and Frequentist) were distinctly different and set apart. Recent work (aided by increased computer power and availability) has changed all that and today's graduate students and researchers all require an understanding of Bayesian ideas. This book is their starting point.

Probability Theory Y. A. Rozanov 2013-05-27 This clear exposition begins with basic concepts and moves on to combination of events, dependent events and random variables, Bernoulli trials and the De Moivre-Laplace theorem, and more. Includes 150 problems, many with answers.

An Introduction to Probability and Inductive Logic Ian Hacking 2001-07-02 An introductory 2001 textbook on probability and induction written by a foremost philosopher of science.

On the Brink of Paradox Agustin Rayo 2019-04-02 An introduction to awe-inspiring ideas at the brink of paradox: infinities of different sizes, time travel, probability and measure theory, and computability theory. This book introduces the reader to awe-inspiring issues at the intersection of philosophy and mathematics. It explores ideas at the brink of paradox: infinities of different sizes, time travel, probability and measure theory, computability theory, the Grandfather Paradox, Newcomb's Problem, the Principle of Countable Additivity. The goal is to present some exceptionally beautiful ideas in enough detail to enable readers to understand the ideas themselves (rather than watered-down approximations), but without supplying so much detail that they abandon the effort. The philosophical content requires a mind attuned to subtlety; the most demanding of the mathematical ideas require familiarity with college-level mathematics or mathematical proof. The book covers Cantor's revolutionary thinking about infinity, which leads to the result that some infinities are bigger than others; time travel and free will, decision theory, probability, and the Banach-Tarski Theorem, which states that it is possible to decompose a ball into a finite number of pieces and reassemble the pieces so as to get two balls that are each the same size as the original. Its investigation of computability theory leads to a proof of Gödel's Incompleteness Theorem,

which yields the amazing result that arithmetic is so complex that no computer could be programmed to output every arithmetical truth and no falsehood. Each chapter is followed by an appendix with answers to exercises. A list of recommended reading points readers to more advanced discussions. The book is based on a popular course (and MOOC) taught by the author at MIT.

Probability Theory Alfred Renyi 2007-05-11 The founder of Hungary's Probability Theory School, A. Rényi made significant contributions to virtually every area of mathematics. This introductory text is the product of his extensive teaching experience and is geared toward readers who wish to learn the basics of probability theory, as well as those who wish to attain a thorough knowledge in the field. Based on the author's lectures at the University of Budapest, this text requires no preliminary knowledge of probability theory. Readers should, however, be familiar with other branches of mathematics, including a thorough understanding of the elements of the differential and integral calculus and the theory of real and complex functions. These well-chosen problems and exercises illustrate the algebras of events, discrete random variables, characteristic functions, and limit theorems. The text concludes with an extensive appendix that introduces information theory.