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Probability Essentials Discretization of Processes Stochastic Integration and Differential Equations Probability Essentials Probability Essentials, 2E Probability and Stochastics A First Look at Rigorous Probability Theory Stochastic Calculus and Financial Applications Point Process Theory and Applications Applied Probability and Queues Introduction to Probability Probability Mathematics for Machine Learning An Introduction to Measure Theory Elementary Probability Theory From Elementary Probability to Stochastic Differential Equations with MAPLE® Probability Theory Convergence of Probability Measures Stochastic Integration and Differential Equations Stochasticity in Processes Probabilistic Techniques in Analysis A History of the Central Limit Theorem Measure, Integral and Probability Introduction to Stochastic Processes A Natural Introduction to Probability Theory An Intermediate Course in Probability A Concise Introduction to the Theory of Integration Stochastic Portfolio Theory Applied Stochastic Differential Equations Probability with Martingales Intermediate Probability Continuous Martingales and Brownian Motion Interface between Regulation and Statistics in Drug Development Financial Mathematics, Derivatives and Structured Products Probability and Stochastic Processes Probability Theory and

Mathematical Statistics. Vol. 1 Probability An Elementary Introduction to Stochastic Interest Rate Modeling Brownian Motion and Stochastic Calculus Elements of Probability Theory

"This is a magnificent book! Its purpose is to describe in considerable detail a variety of techniques used by probabilists in the investigation of problems concerning Brownian motion....This is THE book for a capable graduate student starting out on research in probability: the effect of working through it is as if the authors are sitting beside one, enthusiastically explaining the theory, presenting further developments as exercises." –BULLETIN OF THE L.M.S. An intuitive, yet precise introduction to probability theory, stochastic processes, statistical inference, and probabilistic models used in science, engineering, economics, and related fields. This is the currently used textbook for an introductory probability course at the Massachusetts Institute of Technology, attended by a large number of undergraduate and graduate students, and for a leading online class on the subject. The book covers the fundamentals of probability theory (probabilistic models, discrete and continuous random variables, multiple random variables, and limit theorems), which are typically part of a first course on the subject. It also contains a number of more advanced topics, including transforms, sums of random variables, a fairly detailed introduction to Bernoulli, Poisson, and Markov processes, Bayesian inference, and an introduction to classical statistics. The book strikes a balance between simplicity in exposition and sophistication in analytical reasoning. Some of the more mathematically rigorous analysis is explained intuitively in the main text, and then developed in detail (at the level of advanced calculus) in the numerous solved theoretical problems. "This book is a highly recommendable survey of mathematical tools and results in applied probability with special emphasis on queueing theory....The second edition at hand is a thoroughly updated and considerably expended version of the first edition.... This book and the way the various topics are balanced are a welcome addition to the literature. It is an indispensable source of information for both advanced graduate students and researchers." --MATHEMATICAL REVIEWS This book offers a straightforward introduction to the mathematical theory of probability. It presents the central results and techniques of the subject in a complete and self-contained account. As a result, the emphasis is on giving results in simple forms with clear proofs and to eschew more powerful forms of theorems which require technically involved proofs. Throughout there are a wide variety of exercises to illustrate and to develop ideas in the text. 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. Interest rate modeling and the pricing of related derivatives remain subjects of increasing importance in financial mathematics and risk management. This book provides an accessible introduction to these topics by a step-by-step presentation of concepts with a focus on explicit calculations. Each chapter is accompanied with exercises and their complete solutions, making the book suitable for advanced undergraduate and graduate level students. This second edition retains the main features of the first edition while incorporating a complete revision of the text as well as additional exercises with their solutions, and a new introductory chapter on credit risk. The stochastic interest rate models considered range from standard short rate to forward rate models, with a treatment of the pricing of related derivatives such as caps and swaptions under forward measures. Some more advanced topics including the BGM model and an approach to its calibration are also covered. In recent years, there has been an upsurge of interest in using techniques drawn from probability to tackle problems in analysis. These applications arise in subjects such as potential theory, harmonic analysis, singular integrals, and the study of analytic functions. This book presents a modern survey of these methods at the level of a beginning Ph.D. student. Highlights of this book include the construction of the Martin boundary, probabilistic proofs of the boundary Harnack principle, Dahlberg's theorem, a probabilistic proof of Riesz' theorem on the Hilbert transform, and Makarov's theorems on the support of harmonic measure. The author assumes that a reader has some background in basic real analysis, but the book includes proofs of all the results from probability theory and advanced analysis required. Each chapter concludes with exercises ranging from the routine to the difficult. In addition, there are included discussions of open problems and further avenues of research. Stochastic portfolio theory is a mathematical methodology for constructing stock portfolios and for analyzing the effects induced on the behavior of these portfolios by changes in the distribution of capital in the market. Stochastic portfolio theory has both theoretical and practical applications: as a theoretical tool it can be used to construct examples of theoretical portfolios with specified characteristics and to determine the distributional component of portfolio return. This book is an introduction to stochastic portfolio theory for investment professionals and for students of mathematical finance. Each chapter includes a number of problems of varying levels of difficulty and a brief summary of the principal results of the chapter, without proofs. This is an introduction to probabilistic and statistical concepts necessary to understand the basic ideas and methods of stochastic differential equations. Based on measure theory, which is introduced as smoothly as possible, it provides practical skills in the use of MAPLE in the context of probability and its applications. It offers to graduates and advanced undergraduates an overview and intuitive background for more advanced studies. Features an introduction to probability theory using measure theory. This work provides proofs of the essential introductory results and presents the measure theory and mathematical details in terms of intuitive probabilistic concepts, rather than as separate, imposing subjects. It has been 15 years since the first edition of Stochastic Integration and Differential Equations, A New Approach appeared, and in those years many other texts on the same subject have been published, often with connections to applications, especially mathematical finance. Yet in spite of the apparent simplicity of approach, none of these books has used the functional analytic method of presenting semimartingales and stochastic integration. Thus a 2nd edition seems worthwhile and timely, though it is no longer appropriate to call it "a new approach". The new edition has several significant changes, most prominently the addition of exercises for solution. These are intended to supplement the text, but lemmas needed in a proof are never relegated to the exercises. Many of the exercises have been tested by graduate students at Purdue and Cornell Universities. Chapter 3 has been completely redone, with a new, more intuitive and simultaneously elementary proof of the fundamental Doob-Meyer decomposition theorem, the more general version of the Girsanov theorem due to Lenglart, the Kazamaki-Novikov criteria for exponential local martingales to be martingales, and a modern treatment of compensators. Chapter 4 treats sigma martingales (important in finance theory) and gives a more comprehensive treatment of martingale representation, including both the Jacod-Yor theory and Emery's examples of martingales that actually have martingale representation (thus going beyond the standard cases of Brownian motion and the compensated Poisson process). New topics added include an introduction to the theory of the expansion of filtrations, a treatment of the Fefferman martingale inequality, and that the dual space of the martingale space H^1 can be identified with BMO martingales. Solutions to selected exercises are available at the web site of the author, with current URL http://www.orie.cornell.edu/~protter/books.html. The purpose of this book is to provide the reader with a solid background and understanding of the basic results and methods in probability the ory before entering into more advanced courses (in probability and/or statistics). The presentation is fairly thorough and detailed with many solved examples. Several examples are solved with different methods in order to illustrate their different levels of sophistication, their pros, and their cons. The motivation for this style of exposition is that experi ence has proved that the hard part in courses of this kind usually in the application of the results and methods; to know how, when, and where to apply what; and then, technically, to solve a given problem once one knows how to proceed. Exercises are spread out along the way, and every chapter ends with a large selection of problems. Chapters I through VI focus on some central areas of what might be called pure probability theory: multivariate random variables, condi tioning, transforms, order variables, the multivariate normal distribution, and convergence. A final chapter is devoted to the Poisson process be cause of its fundamental role in the theory of stochastic processes, but also because it provides an excellent application of the results and meth ods acquired earlier in the book. As an extra bonus, several facts about this process, which are frequently more or less taken for granted, are thereby properly verified. This is a masterly introduction to the modern, and rigorous, theory of probability. The author emphasises martingales and develops all the necessary measure theory. Designed for the analyst, physicist, engineer, or economist, provides such readers with most of the measure theory they will ever need. Emphasis is on the concrete aspects of the subject. Subjects include classical theory, Lebesgue's measure, Lebesgue integration, products of measures, changes of variable, some basic inequalities, and abstract theory. Annotation copyright by Book News, Inc., Portland, OR 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. Most books that deal with probability do not cover any measure theory, yet knowledge of measure theory is needed to learn probability. This book covers all the essentials of probability theory while developing the necessary measure theory. The book will bring its reader from a starting knowledge of probability through the basics of Martingale theory in a lean, directed manner. It is perfect for those needing a quick grounding in probability theory in order to move on to more advanced topics useful in applied areas such as finance, economics, electrical engineering, and operations research. Compactly written, but nevertheless very readable, appealing to intuition, this introduction to probability theory is an excellent textbook for a one-semester course for undergraduates in any direction that uses probabilistic ideas. Technical machinery is only introduced when necessary. The route is rigorous but does not use measure theory. The text is illustrated with many original and surprising examples and problems taken from classical applications like gambling, geometry or graph theory, as well as from applications in biology, medicine, social sciences, sports, and coding theory. Only first-year calculus is required. With the critical role of statistics in the design, conduct, analysis and reporting of clinical trials or observational studies intended for regulatory purposes, numerous guidelines have been issued by regulatory authorities around the world focusing on statistical issues related to drug development. However, the available literature on this important topic is sporadic, and often not readily accessible to drug developers or regulatory personnel. This book provides a systematic exposition of the interplay between the two disciplines, including emerging themes pertaining to the acceleration of the development of pharmaceutical medicines to serve patients with unmet needs. Features: Regulatory and statistical interactions throughout the drug development continuum The critical role of the statistician in relation to the changing regulatory and healthcare landscapes Statistical issues that commonly arise in the course of drug development and regulatory interactions Trending topics in drug development, with emphasis on current regulatory thinking and the associated challenges and opportunities The book is designed to be accessible to readers with an intermediate knowledge of statistics, and can be a useful resource to statisticians, medical researchers, and regulatory personnel in drug development, as well as graduate students in the health sciences. The authors' decades of experience in the pharmaceutical industry and academia, and extensive regulatory experience, comes through in the many examples throughout the book. This book is intended as an introduction to Probability Theory and Mathematical Statistics for students in mathematics, the physical sciences, engineering, and related fields. It is based on the author's 25 years of experience teaching probability and is squarely aimed at helping students overcome common difficulties in learning the subject. The focus of the book is an explanation of the theory, mainly by the use of many examples. Whenever possible, proofs of stated results are provided. All sections conclude with a short list of problems. The book also includes several optional sections on more advanced topics. This textbook would be ideal for use in a first course in Probability Theory. Contents: Probabilities Conditional Probabilities and Independence Random Variables and Their Distribution Operations on Random Variables Expected Value, Variance, and Covariance Normally Distributed Random Vectors Limit Theorems Mathematical Statistics Appendix Bibliography Index The idea of this book began with an invitation to give a course at the Third Chilean Winter School in Probability and Statistics, at Santiago de Chile, in July, 1984. Faced with the problem of teaching stochastic integration in only a few weeks, I realized that the work of C. Dellacherie [2] provided an outline for just such a pedagogic approach. I developed this into aseries of lectures (Protter [6]), using the work of K. Bichteler [2], E. Lenglart [3] and P. Protter [7], as well as that of Dellacherie. I then taught from these lecture notes, expanding and improving them, in courses at Purdue University, the University of Wisconsin at

Madison, and the University of Rouen in France. I take this opportunity to thank these institut ions and Professor Rolando Rebolledo for my initial invitation to Chile. This book assumes the reader has some knowledge of the theory of stochastic processes, including elementary martingale theory. While we have recalled the few necessary martingale theorems in Chap. I, we have not provided proofs, as there are already many excellent treatments of martingale theory readily available (e. g. , Breiman [1], Dellacherie-Meyer [1,2], or Ethier Kurtz [1]). There are several other texts on stochastic integration, all of which adopt to some extent the usual approach and thus require the general theory. The books of Elliott [1], Kopp [1], Metivier [1], Rogers-Williams [1] and to a much lesser extent Letta [1] are examples. This is a graduate text introducing the fundamentals of measure theory and integration theory, which is the foundation of modern real analysis. The text focuses first on the concrete setting of Lebesgue measure and the Lebesgue integral (which in turn is motivated by the more classical concepts of Jordan measure and the Riemann integral), before moving on to abstract measure and integration theory, including the standard convergence theorems, Fubini's theorem, and the Carathéodory extension theorem. Classical differentiation theorems, such as the Lebesgue and Rademacher differentiation theorems, are also covered, as are connections with probability theory. The material is intended to cover a quarter or semester's worth of material for a first graduate course in real analysis. There is an emphasis in the text on tying together the abstract and the concrete sides of the subject, using the latter to illustrate and motivate the former. The central role of key principles (such as Littlewood's three principles) as providing guiding intuition to the subject is also emphasized. There are a large number of exercises throughout that develop key aspects of the theory, and are thus an integral component of the text. As a supplementary section, a discussion of general problem-solving strategies in analysis is also given. The last three sections discuss optional topics related to the main matter of the book. In applications, and especially in mathematical finance, random time-dependent events are often modeled as stochastic processes. Assumptions are made about the structure of such processes, and serious researchers will want to justify those assumptions through the use of data. As statisticians are wont to say, “In God we trust; all others must bring data.” This book establishes the theory of how to go about estimating not just scalar parameters about a proposed model, but also the underlying structure of the model itself. Classic statistical tools are used: the law of large numbers, and the central limit theorem. Researchers have recently developed creative and original methods to use these tools in sophisticated (but highly technical) ways to reveal new details about the underlying structure. For the first time in book form, the authors present these latest techniques, based on research from the last 10 years. They include new findings. This book will be of special interest to researchers, combining the theory of mathematical finance with its investigation using market data, and it will also prove to be useful in a broad range of applications, such as to mathematical biology, chemical engineering, and physics. This book provides an introduction to probability theory and its applications. The emphasis is on essential probabilistic reasoning, which is illustrated with a large number of samples. The fourth edition adds material related to mathematical finance as well as expansions on stable laws and martingales. From the reviews: "Almost thirty years after its first edition, this charming book continues to be an excellent text for teaching

and for self study." --
STATISTICAL PAPERS
Stochastic calculus has important applications to mathematical finance. This book will appeal to practitioners and students who want an elementary introduction to these areas. From the reviews: "As the preface says, ‘This is a text with an attitude, and it is designed to reflect, wherever possible and appropriate, a prejudice for the concrete over the abstract’. This is also reflected in the style of writing which is unusually lively for a mathematics book." --
ZENTRALBLATT MATH
Mathematically rigorous exposition of the basic theory of marked point processes and piecewise deterministic stochastic processes Point processes are constructed from scratch with detailed proofs Includes applications with examples and exercises in survival analysis, branching processes, ruin probabilities, sports (soccer), finance and risk management, and queueing theory Accessible to a wider cross-disciplinary audience Elements of Probability Theory focuses on the basic ideas and methods of the theory of probability. The book first discusses events and probabilities, including the classical meaning of probability, fundamental properties of probabilities, and the primary rule for the multiplication of probabilities. The text also touches on random variables and probability distributions. Topics include discrete and random variables; functions of random variables; and binomial distributions. The selection also discusses the numerical characteristics of probability distributions; limit theorems and estimates of the mean; and the law of large numbers. The text also describes linear correlation, including conditional expectations and their properties, coefficient of correlation, and best linear approximation to the regression function. The book presents tables that show the values of the normal probability integral, Poisson

distribution, and values of the normal probability density. The text is a good source of data for readers and students interested in probability theory. Preface -- Combinatorics -- Probability -- Expectation values -- Distributions -- Gaussian approximations -- Correlation and regression -- Appendices. Intermediate Probability is the natural extension of the author's Fundamental Probability. It details several highly important topics, from standard ones such as order statistics, multivariate normal, and convergence concepts, to more advanced ones which are usually not addressed at this mathematical level, or have never previously appeared in textbook form. The author adopts a computational approach throughout, allowing the reader to directly implement the methods, thus greatly enhancing the learning experience and clearly illustrating the applicability, strengths, and weaknesses of the theory. The book: Places great emphasis on the numeric computation of convolutions of random variables, via numeric integration, inversion theorems, fast Fourier transforms, saddlepoint approximations, and simulation. Provides introductory material to required mathematical topics such as complex numbers, Laplace and Fourier transforms, matrix algebra, confluent hypergeometric functions, digamma functions, and Bessel functions. Presents full derivation and numerous computational methods of the stable Paretian and the singly and doubly non-central distributions. A whole chapter is dedicated to mean-variance mixtures, NIG, GIG, generalized hyperbolic and numerous related distributions. A whole chapter is dedicated to nesting, generalizing, and asymmetric extensions of popular distributions, as have become popular in empirical finance and other applications. Provides all essential programming code in Matlab and R. The user-friendly style of writing and attention to detail means that self-study is easily possible, making the book ideal for senior undergraduate and graduate students of mathematics, statistics, econometrics, finance, insurance, and computer science, as well as researchers and professional statisticians working in these fields. No detailed description available for "GRIGELIONIS: PROCEEDINGS OF THE FIFTH VILNIUS CONFERE E-BOOK". With this hands-on introduction readers will learn what SDEs are all about and how they should use them in practice. This study discusses the history of the central limit theorem and related probabilistic limit theorems from about 1810 through 1950. In this context the book also describes the historical development of analytical probability theory and its tools, such as characteristic functions or moments. The central limit theorem was originally deduced by Laplace as a statement about approximations for the distributions of sums of independent random variables within the framework of classical probability, which focused upon specific problems and applications. Making this theorem an autonomous mathematical object was very important for the development of modern probability theory. A comprehensive and accessible presentation of probability and stochastic processes with emphasis on key theoretical concepts and real-world applications With a sophisticated approach, Probability and Stochastic Processes successfully balances theory and applications in a pedagogical and accessible format. The book’s primary focus is on key theoretical notions in probability to provide a foundation for understanding concepts and examples related to stochastic processes. Organized into two main sections, the book begins by developing probability theory with topical coverage on probability measure; random variables; integration theory; product spaces, conditional distribution, and conditional expectations; and limit theorems. The second part explores stochastic processes and related concepts including the Poisson process, renewal processes, Markov chains, semi-Markov processes, martingales, and Brownian motion. Featuring a logical combination of traditional and complex theories as well as practices, Probability and Stochastic Processes also includes: Multiple examples from disciplines such as business, mathematical finance, and engineering Chapter-by-chapter exercises and examples to allow readers to test their comprehension of the presented material A rigorous treatment of all probability and stochastic processes concepts An appropriate textbook for probability and stochastic processes courses at the upper-undergraduate and graduate level in mathematics, business, and electrical engineering, Probability and Stochastic Processes is also an ideal reference for researchers and practitioners in the fields of mathematics, engineering, and finance. This very well written and accessible book emphasizes the reasons for studying measure theory, which is the foundation of much of probability. By focusing on measure, many illustrative examples and applications, including a thorough discussion of standard probability distributions and densities, are opened. The book also includes many problems and their fully worked solutions. This book has developed over the past fifteen years from a modern course on stochastic chemical kinetics for graduate students in physics, chemistry and biology. The first part presents a systematic collection of the mathematical background material needed to understand probability, statistics, and stochastic processes as a prerequisite for the increasingly challenging practical applications in chemistry and the life sciences examined in the second part. Recent advances in the development of new techniques and in the resolution of conventional experiments at nano-scales have been tremendous: today molecular spectroscopy can provide insights into processes down to scales at which current theories at the interface of physics, chemistry and the life sciences cannot be successful without a firm grasp of randomness and its sources. Routinely measured data is now sufficiently accurate to allow the direct recording of fluctuations. As a result, the sampling of data and the modeling of relevant processes are doomed to produce artifacts in interpretation unless the observer has a solid background in the mathematics of limited reproducibility. The material covered is presented in a modular approach, allowing more advanced sections to be skipped if the reader is primarily interested in applications. At the same time, most derivations of analytical solutions for the selected examples are provided in full length to guide more advanced readers in their attempts to derive solutions on their own. The book employs uniform notation throughout, and a glossary has been added to define the most important notions discussed. A graduate-course text, written for readers familiar with measure-theoretic probability and discrete-time processes, wishing to explore stochastic processes in continuous time. The vehicle chosen for this exposition is Brownian motion, which is presented as the canonical example of both a martingale and a Markov process with continuous paths. In this context, the theory of stochastic integration and stochastic calculus is developed, illustrated by results concerning representations of martingales and change of measure on Wiener space, which in turn permit a presentation of recent advances in financial economics. The book contains a detailed discussion of weak and strong solutions of stochastic differential equations and a study of local time for semimartingales, with special emphasis on the theory of Brownian local time. The whole is backed by a large number of problems and exercises. A new look at weak-convergence methods in metric spaces-from a master of probability theory In this new edition, Patrick Billingsley updates his classic work Convergence of Probability Measures to reflect developments of the past thirty years. Widely known for his straightforward approach and reader-friendly style, Dr. Billingsley presents a clear, precise, up-to-date account of probability limit theory in metric spaces. He incorporates many examples and applications that illustrate the power and utility of this theory in a range of disciplines-from analysis and number theory to statistics, engineering, economics, and population biology. With an emphasis on the simplicity of the mathematics and smooth transitions between topics, the Second Edition boasts major revisions of the sections on dependent random variables as well as new sections on relative measure, on lacunary trigonometric series, and on the Poisson-Dirichlet distribution as a description of the long cycles in permutations and the large divisors of integers. Assuming only standard measure-theoretic probability and metric-space topology, Convergence of Probability Measures provides statisticians and mathematicians with basic tools of probability theory as well as a springboard to the "industrial-strength" literature available today. This book introduces readers to the financial markets, derivatives, structured products and how the products are modelled and implemented by practitioners. In addition, it equips readers with the necessary knowledge of financial markets needed in order to work as product structurers, traders, sales or risk managers. As the book seeks to unify the derivatives modelling and the financial engineering practice in the market, it will be of interest to financial practitioners and academic researchers alike. Further, it takes a different route from the existing financial mathematics books, and will appeal to students and practitioners with or without a scientific background. The book can also be used as a textbook for the following courses: • Financial Mathematics (undergraduate level) • Stochastic Modelling in Finance (postgraduate level) • Financial Markets and Derivatives (undergraduate level) • Structured Products and Solutions (undergraduate/postgraduate level) Emphasizing fundamental mathematical ideas rather than proofs, Introduction to Stochastic Processes, Second Edition provides quick access to important foundations of probability theory applicable to problems in many fields. Assuming that you have a reasonable level of computer literacy, the ability to write simple programs, and the access to software for linear algebra computations, the author approaches the problems and theorems with a focus on stochastic processes evolving with time, rather than a particular emphasis on measure theory. For those lacking in exposure to linear differential and difference equations, the author begins with a brief introduction to these concepts. He proceeds to discuss Markov chains, optimal stopping, martingales, and Brownian motion. The book concludes with a chapter on stochastic integration. The author supplies many basic, general examples and provides exercises at the end of each chapter. New to the Second Edition: Expanded chapter on stochastic integration that introduces modern mathematical finance Introduction of Girsanov transformation and the Feynman-Kac formula Expanded discussion of Itô's formula and the Black-Scholes formula for pricing options New topics such as Doob's maximal inequality and a discussion on self similarity in the chapter on Brownian motion Applicable to the fields of mathematics, statistics, and engineering as well as computer science, economics, business, biological science, psychology, and engineering, this concise introduction is an excellent resource both for students and professionals. This introduction can be used, at the beginning graduate level, for a one-semester course on probability theory or for self-direction without benefit of a formal course; the measure theory needed is developed in the text. It will also be useful for students and teachers in related areas such as finance theory, electrical engineering, and operations research. The text covers the essentials in a directed and lean way with 28 short chapters, and assumes only an undergraduate background in mathematics. Readers are taken right up to a knowledge of the basics of Martingale Theory, and the interested student will be ready to continue with the study of more advanced topics, such as Brownian Motion and Ito Calculus, or Statistical Inference.

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