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Random Walks in the Quarter Plane - Guy Fayolle - 2012-12-06
Promoting original mathematical methods to determine the invariant measure of two-dimensional random walks in domains with boundaries, the authors use Using Riemann surfaces and boundary value problems to propose completely new approaches to solve functional equations of two complex variables. These methods can also be employed to characterize the transient behavior of random walks in the quarter plane.

Random Walks in a Quarter Plane with Zero Drifts - G. Fayolle - 1990

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Random Walks in the Quarter Plane - Guy Fayolle - 2017-02-06
This monograph aims to promote original mathematical methods to determine the invariant measure of two-dimensional random walks in domains with boundaries. Such processes arise in numerous applications and are of interest in several areas of mathematical research, such as Stochastic Networks, Analytic Combinatorics, and Quantum Physics. This second edition consists of two parts. Part I is a revised update of the first edition (1999), with additional recent results on the group of a random walk. The theoretical approach given therein has been developed by the authors since the early 1970s. By using Complex Function Theory, Boundary
Stochastic Networks, Analytic Combinatorics, Theory, completely new methods are proposed for solving functional equations of two complex variables, which can also be applied to characterize the Transient Behavior of the walks, as well as to find explicit solutions to the one-dimensional Quantum Three-Body Problem, or to tackle a new class of Integrable Systems. Part II borrows special case-studies from queueing theory (in particular, the famous problem of Joining the Shorter of Two Queues) and enumerative combinatorics (Counting, Asymptotics). Researchers and graduate students should find this book very useful.

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Drifts. I: Ergodicity and Null Recurrence - Chen - 2015

Random Walks in the Quarter-plane - Yanting Chen - 2015

Random Walks in a Quarter Plane with Zero Drifts - I. M. Asymont - 1994

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Analytic Continuation of Generating Functions for Two-Dimensional Random Walks in the Quarter Plane - Simona Jane Sklenar - 2015

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Abstract: "In this paper, we solve the problem of non ergodicity [sic] and null recurrence for random walks in the quarter plane with zero drifts in the interior of the domain. A general criterion for null recurrence is given and then used to construct sub and supermartingales by means of Lyapounov functions, which are here functionals of quadratic forms."


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**Transcendence in Algebra, Combinatorics, Geometry and Number Theory** - Alin Bostan

An Invitation to Analytic Combinatorics - Stephen Melczer - 2020-12-22
This book uses new mathematical tools to examine broad computability and complexity questions in enumerative combinatorics, with applications to other areas of mathematics, theoretical computer science, and physics. A focus on effective algorithms leads to the development of computer algebra software of use to researchers in these domains. After a survey of current results and open problems on decidability in enumerative combinatorics, the text shows how the cutting edge of this research is the new domain of Analytic Combinatorics in Several Variables (ACSV). The remaining pedagogical development of the theory, applications (including the resolution by this author of conjectures in lattice path enumeration which resisted several other approaches), and the development of algorithms. The final chapters in the text show, through examples and general theory, how results from stratified Morse theory can help refine some of these computability questions. Complementing the written presentation are over 50 worksheets for the SageMath and Maple computer algebra systems working through examples in the text.

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**Rare Events Asymptotics for a Random Walk in the Quarter Plane** - Fabrice Guillemin - 2009

**In and Out of Equilibrium 3: Celebrating Vladas Sidoravicius** - Maria Eulália Vares - 2021

This is a volume in memory of Vladas Sidoravicius who passed away in 2019. Vladas has edited two volumes appeared in this series ("In and Out of Equilibrium") and is now honored by friends and colleagues with research papers reflecting Vladas' interests and contributions to probability theory.—

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Random Walks, Boundaries and Spectra - Daniel Lenz - 2011-06-16
These proceedings represent the current state of research on the topics 'boundary theory' and 'spectral and probability theory' of random walks on infinite graphs. They are the result of the two workshops held in Styria (Graz and St. Kathrein am Offenegg, Austria) between June 29th and July 5th, 2009. Many of the participants joined both meetings. Even though the perspectives range from very different fields of mathematics, they all contribute with important results to the same wonderful topic from structure theory, which, by extending a quotation of Laurent Saloff-Coste, could be described by 'exploration of groups by random processes'.

Probability and Phase Transition - G.R. Grimmett - 2013-04-17
This volume describes the current state of knowledge of random spatial processes, particularly those arising in physics. The emphasis is on survey articles which describe areas of current interest to probabilists and physicists working on the probability theory of phase transition. Special attention is given to topics deserving further research. The principal
particle systems, percolation, Ising and Potts mathematical theory of random walk, interacting particle systems, percolation, Ising and Potts models, spin glasses, cellular automata, quantum spin systems, and metastability. The level of presentation and review is particularly suitable for postgraduate and postdoctoral workers in mathematics and physics, and for advanced specialists in the probability theory of spatial disorder and phase transition.

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**Queueing Theory and Network Applications** - Tuan Phung-Duc - 2019-08-22
This book constitutes the proceedings of the 14th International Conference on Queueing Theory and Network Applications, QTNA 2019, held in Ghent, Belgium, in August 2019. The 23 full papers included in this volume were carefully reviewed and selected from 49 initial submissions. The papers are organized in topical sections on Retrial Queues; Controllable Queues; Strategic Queues; Queueing Networks; Scheduling Policies; Multidimensional Systems; and Queueing Models in Applications.
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**Mathematics and Computer Science II**
Brigitte Chauvin - 2012-12-06
This is the second volume in a series of innovative proceedings entirely devoted to the connections between mathematics and computer science. Here mathematics and computer science are directly confronted and joined to tackle intricate problems in computer science with deep and innovative mathematical approaches. The book serves as an outstanding tool and a main information source for a large public in applied mathematics, discrete mathematics and computer science, including researchers, teachers, graduate students and engineers. It provides an overview of the current questions in computer science and the related modern and powerful mathematical methods. The range of applications is very wide and reaches beyond computer science.
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**Non-homogeneous Random Walks** - Mikhail Menshikov - 2016-12-22

Stochastic systems provide powerful abstract models for a variety of important real-life applications: for example, power supply, traffic flow, data transmission. They (and the real systems they model) are often subject to phase transitions, behaving in one way when a parameter is below a certain critical value, then switching behaviour as soon as that critical value is reached. In a real system, we do not necessarily have control over all the parameter values, so it is important to know how to find critical points and to understand system behaviour near these points. This book is a

'Lyapunov function' method applied to near-critical stochastic systems, exemplified by non-homogeneous random walks. Applications treat near-critical stochastic systems and range across modern probability theory from stochastic billiards models to interacting particle systems. Spatially non-homogeneous random walks are explored in depth, as they provide prototypical near-critical systems.

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**Topics in the Constructive Theory of Countable Markov Chains** - G. Fayolle - 1995-05-18
Provides methods of analysing Markov chains based on Lyapunov functions.

This volume is dedicated to F. I. Karpelevich, an outstanding Russian mathematician who made important contributions to applied probability theory. The book contains original papers focusing on several areas of applied probability and its uses in modern industrial processes, telecommunications, computing, mathematical economics, and finance. It opens with a review of Karpelevich's contributions to applied probability theory and includes a bibliography of his works. Other articles discuss queueing network theory, in particular, in heavy traffic approximation (fluid models). The book is suitable for graduate students, theoretical and applied probabilists, computer scientists, and engineers.

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Séminaire de Probabilités XLVIII - Catherine Donati-Martin - 2016-11-17
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which provide a substantial glimpse of the included are some particularly interesting articles involving harmonic measures, random fields and loop soups. The featured contributors are Mathias Beiglböck, Martin Huesmann and Florian Stebegg, Nicolas Juillet, Gilles Pags, Dai Taguchi, Alexis Devulder, Máté Barczy and Peter Kern, I. Bailleul, Jürgen Angst and Camille Tardif, Nicolas Privault, Anita Behme, Alexander Lindner and Makoto Maejima, Cédric Lecouvey and Kilian Raschel, Christophe Profeta and Thomas Simon, O. Khorunzhiy and Songzi Li, Franck Maunoury, Stéphane Laurent, Anna Aksamit and Libo Li, David Applebaum, and Wendelin Werner.

**Asymptotic Laws and Methods in Stochastics**
- Donald Dawson - 2015-11-12
This book contains articles arising from a conference in honour of mathematician-statistician Miklós Csörgő on the occasion of his 80th birthday, held in Ottawa in July 2012. It comprises research papers and overview articles, which provide a substantial glimpse of the history and state-of-the-art of the field of asymptotic methods in probability and statistics, written by leading experts. The volume consists of twenty articles on topics on limit theorems for self-normalized processes, planar processes, the central limit theorem and laws of large numbers, change-point problems, short and long range dependent time series, applied probability and stochastic processes, and the theory and methods of statistics. It also includes Csörgő’s list of publications during more than 50 years, since 1962.

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**Number Theory** - Kağan Kurşungöz - 2021-12-20

Three major branches of number theory are included in the volume: namely analytic number theory, algebraic number theory, and transcendental number theory. Original research is presented that discusses modern techniques and survey papers from selected academic scholars.

**Analytical and Stochastic Modelling Techniques and Applications** - Sabine Wittevrongel - 2016-08-03

This book constitutes the refereed proceedings of the 23rd International Conference on Analytical and Stochastic Modelling Techniques and Applications, ASMTA 2016, held in Cardiff, UK, in August 2016. The 21 full papers presented in this book were carefully reviewed and selected from 30 submissions. The papers discuss the latest developments in analytical, numerical and simulation algorithms for stochastic systems, including Markov processes, queueing networks, stochastic Petri nets, process algebras, game
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Algorithmic Probability and Combinatorics - Manuel Lladser - 2010-07-30
This volume contains the proceedings of the AMS Special Sessions on Algorithmic Probability and Combinatorics held at DePaul University on October 5-6, 2007 and at the University of British Columbia on October 4-5, 2008. This volume collects cutting-edge research and expository on algorithmic probability and combinatorics. It includes contributions by well-established experts and younger researchers who use generating functions, algebraic and probabilistic methods as well as asymptotic analysis on a daily basis. Walks in the quarter-plane and random walks (quantum, rotor and self-avoiding), permutation tableaux, and random permutations are considered. In addition, articles in the volume present a variety of saddle-point and geometric methods for the asymptotic analysis of the coefficients of single-and multivariable generating functions associated with combinatorial objects and discrete random structures. The volume should appeal to pure and applied mathematicians, as well as mathematical physicists; in particular, anyone interested in computational aspects of probability, combinatorics and enumeration. Furthermore,
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**STACS 2005** - Volker Diekert - 2005-02-16
This book constitutes the refereed proceedings of the 22nd Annual Symposium on Theoretical Aspects of Computer Science, STACS 2005, held in Stuttgart, Germany in February 2005. The 54 revised full papers presented together with 3 invited papers were carefully reviewed and selected from 217 submissions. A broad variety of topics from theoretical computer science are
Analytical and Stochastic Modeling
algorithmics, computational discrete mathematics, automata theory, combinatorial optimization and approximation, networking and graph theory, computational geometry, grammar systems and formal languages, etc.

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Techniques and Applications - Khalid Al-Begain - 2012-06-01
This book constitutes the refereed proceedings of the 19th International Conference on Analytical and Stochastic Modelling Techniques and Applications, ASMTA 2012, held in Grenoble, France, in June 2012. The 20 revised full papers presented were carefully reviewed and selected from numerous submissions. The papers are organized in topical sections on queueing systems; networking applications; Markov chains; stochastic modelling.

Analytical and Stochastic Modeling Techniques and Applications - Khalid Al-Begain - 2012-06-01
This book constitutes the refereed proceedings of the 19th International Conference on Analytical and Stochastic Modelling Techniques and Applications, ASMTA 2012, held in Grenoble, France, in June 2012. The 20 revised full papers presented were carefully reviewed and selected
include the kernel method developed by Flajolet organized in topical sections on queueing systems; networking applications; Markov chains; stochastic modelling.

**Lattice Path Combinatorics and Applications**  
- George E. Andrews - 2019-03-02  
The most recent methods in various branches of lattice path and enumerative combinatorics along with relevant applications are nicely grouped together and represented in this research contributed volume. Contributions to this edited volume will be mainly research articles however it will also include several captivating, expository articles (along with pictures) on the life and mathematical work of leading researchers in lattice path combinatorics and beyond. There will be four or five expository articles in memory of Shreeram Shankar Abhyankar and Philippe Flajolet and honoring George Andrews and Lajos Takács. There may be another brief article in memory of Professors Jagdish Narayan Srivastava and Joti Lal Jain. New research results and others for counting different classes of lattice paths continues to produce new results in counting lattice paths. The recent investigation of Fishburn numbers has led to interesting counting interpretations and a family of fascinating congruences. Formulas for new methods to obtain the number of $F_q$-rational points of Schubert varieties in Grassmannians continues to have research interest and will be presented here. Topics to be included are far reaching and will include lattice path enumeration, tilings, bijections between paths and other combinatoric structures, non-intersecting lattice paths, varieties, Young tableaux, partitions, enumerative combinatorics, discrete distributions, applications to queueing theory and other continuous time models, graph theory and applications. Many leading mathematicians who spoke at the conference from which this volume derives, are expected to send contributions including. This volume also
newcomers to the Lattice Path Combinatorics Conference series; “The 8th Conference on Lattice Path Combinatorics and Applications” provided opportunities for new collaborations; some of the products of these collaborations will also appear in this book. This book will have interest for researchers in lattice path combinatorics and enumerative combinatorics. This will include subsets of researchers in mathematics, statistics, operations research and computer science. The applications of the material covered in this edited volume extends beyond the primary audience to scholars interested queuing theory, graph theory, tiling, partitions, distributions, etc. An attractive bonus within our book is the collection of special articles describing the top recent researchers in this area of study and documenting the interesting history of who, when and how these beautiful combinatorial results were originally discovered.

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provided opportunities for new collaborations; counting interpretations and a family of fascinating congruences. Formulas for new methods to obtain the number of $F_q$-rational points of Schubert varieties in Grassmannians continues to have research interest and will be presented here. Topics to be included are far reaching and will include lattice path enumeration, tilings, bijections between paths and other combinatoric structures, non-intersecting lattice paths, varieties, Young tableaux, partitions, enumerative combinatorics, discrete distributions, applications to queueing theory and other continuous time models, graph theory and applications. Many leading mathematicians who spoke at the conference from which this volume derives, are expected to send contributions including. This volume also presents the stimulating ideas of some exciting newcomers to the Lattice Path Combinatorics Conference series; “The 8th Conference on Lattice Path Combinatorics and Applications”

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These volumes cover non-linear filtering (prediction and smoothing) theory and its
estimation, control with incomplete data, information theory, and sequential testing of hypothesis. Also presented is the theory of martingales, of interest to those who deal with problems in financial mathematics. These editions include new material, expanded chapters, and comments on recent progress in the field.

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Statistics of Random Processes II - Robert S. Liptser - 2013-03-14
"Written by two renowned experts in the field, the books under review contain a thorough and insightful treatment of the fundamental underpinnings of various aspects of stochastic processes as well as a wide range of applications. Providing clear exposition, deep mathematical results, and superb technical representation, they are masterpieces of the subject of stochastic analysis and nonlinear filtering. These books will become classics." --SIAM REVIEW

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approach for image analysis, mostly from the analysis and nonlinear filtering. These books will become classics." -- SIAM REVIEW

**Image Analysis, Random Fields and Markov Chain Monte Carlo Methods** - Gerhard Winkler - 2012-12-06

"This book is concerned with a probabilistic approach for image analysis, mostly from the Bayesian point of view, and the important Markov chain Monte Carlo methods commonly used. This book will be useful, especially to researchers with a strong background in probability and an interest in image analysis. The author has presented the theory with rigor he doesn't neglect applications, providing numerous examples of applications to illustrate the theory."

-- MATHEMATICAL REVIEWS

**Geometric Science of Information** - Frank Nielsen - 2021-07-14

This book constitutes the proceedings of the 5th International Conference on Geometric Science of Information, GSI 2021, held in Paris, France, in July 2021. The 98 papers presented in this volume were carefully reviewed and selected from 125 submissions. They cover all the main topics and highlights in the domain of geometric science of information, including information geometry manifolds of structured data/information and their advanced
This book constitutes the proceedings of the 5th following topics: Probability and statistics on Riemannian Manifolds; sub-Riemannian geometry and neuromathematics; shapes spaces; geometry of quantum states; geometric and structure preserving discretizations; information geometry in physics; Lie group machine learning; geometric and symplectic methods for hydrodynamical models; harmonic analysis on Lie groups; statistical manifold and Hessian information geometry; geometric mechanics; deformed entropy, cross-entropy, and relative entropy; transformation information geometry; statistics, information and topology; geometric deep learning; topological and geometrical structures in neurosciences; computational information geometry; manifold and optimization; divergence statistics; optimal transport and learning; and geometric structures in thermodynamics and statistical physics.

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by stochastic differential equations. This leads to statistics, information and topology; geometric deep learning; topological and geometrical structures in neurosciences; computational information geometry; manifold and optimization; divergence statistics; optimal transport and learning; and geometric structures in thermodynamics and statistical physics.

**Two-Scale Stochastic Systems** - Yuri Kabanov - 2013-04-17

Two-scale systems described by singularly perturbed SDEs have been the subject of ample literature. However, this new monograph develops subjects that were rarely addressed and could be given the collective description "Stochastic Tikhonov-Levinson theory and its applications." The book provides a mathematical apparatus designed to analyze the dynamic behaviour of a randomly perturbed system with fast and slow variables. In contrast to the deterministic Tikhonov-Levinson theory, the basic model is described in a more realistic way by stochastic differential equations. This leads to a number of new theoretical questions but simultaneously allows us to treat in a unified way a surprisingly wide spectrum of applications like fast modulations, approximate filtering, and stochastic approximation. Two-scale systems described by singularly perturbed SDEs have been the subject of ample literature. However, this new monograph develops subjects that were rarely addressed and could be given the collective description "Stochastic Tikhonov-Levinson theory and its applications." The book provides a mathematical apparatus designed to analyze the dynamic behaviour of a randomly perturbed system with fast and slow variables. In contrast to the deterministic Tikhonov-Levinson theory, the basic model is described in a more realistic way by stochastic differential equations. This leads to a number of new theoretical questions but simultaneously allows us to treat in a unified way a surprisingly wide spectrum of applications like fast modulations, approximate
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Sampling-based computational methods have become a fundamental part of the numerical toolset of practitioners and researchers across an enormous number of different applied domains
illustrated by discussing a wide range of broad treatment of such sampling-based methods, as well as accompanying mathematical analysis of the convergence properties of the methods discussed. The reach of the ideas is illustrated by discussing a wide range of applications and the models that have found wide usage. The first half of the book focuses on general methods; the second half discusses model-specific algorithms. Exercises and illustrations are included.

**Stochastic Simulation: Algorithms and Analysis** - Søren Asmussen - 2007-07-14

Sampling-based computational methods have become a fundamental part of the numerical toolset of practitioners and researchers across an enormous number of different applied domains and academic disciplines. This book provides a broad treatment of such sampling-based methods, as well as accompanying mathematical analysis of the convergence properties of the methods discussed. The reach of the ideas is applications and the models that have found wide usage. The first half of the book focuses on general methods; the second half discusses model-specific algorithms. Exercises and illustrations are included.

**Stochastic Networks and Queues** - Philippe Robert - 2013-04-17

Queues and stochastic networks are analyzed in this book with purely probabilistic methods. The purpose of these lectures is to show that general results from Markov processes, martingales or ergodic theory can be used directly to study the corresponding stochastic processes. Recent developments have shown that, instead of having ad-hoc methods, a better understanding of fundamental results on stochastic processes is crucial to study the complex behavior of stochastic networks. In this book, various aspects of these stochastic models are investigated in depth in an elementary way: Existence of equilibrium, characterization of stationary
equilibrium, characterization of stationary times) and critical regimes, etc. A simple presentation of stationary point processes and Palm measures is given. Scaling methods and functional limit theorems are a major theme of this book. In particular, a complete chapter is devoted to fluid limits of Markov processes.

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**Elements of Queueing Theory** - Francois Baccelli - 2013-11-11

This fundamental exposition of queueing theory, written by leading researchers, answers the need for a mathematically sound reference work on the subject and has become the standard reference. The thoroughly revised second edition contains a substantial number of exercises and their solutions, which makes the book suitable as a textbook.

**Elements of Queueing Theory** - Francois Baccelli - 2013-11-11

This fundamental exposition of queueing theory,
Numerical Solution of Stochastic Differential Equations - Peter E. Kloeden - 2013-04-17
The numerical analysis of stochastic differential equations (SDEs) differs significantly from that of ordinary differential equations. This book provides an easily accessible introduction to SDEs, their applications and the numerical methods to solve such equations. From the reviews: "The authors draw upon their own research and experiences in obviously many disciplines considerable time has obviously been spent writing this in the simplest language possible." --ZAMP

Information-Spectrum Methods in Information Theory - Te Sun Han - 2013-04-18
From the reviews: "This book nicely complements the existing literature on information and coding theory by concentrating on arbitrary nonstationary and/or nonergodic sources and channels with arbitrarily large alphabets. Even with such generality the authors have managed
principle for a class of optimal control problems very fertile exposition rendering new insights into many problems." -- MATHEMATICAL REVIEWS

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**Stochastic Control of Hereditary Systems and Applications** - Mou-Hsiung Chang - 2008-01-03
This monograph develops the Hamilton-Jacobi-Bellman theory via dynamic programming principle for a class of optimal control problems for stochastic hereditary differential equations (SHDEs) driven by a standard Brownian motion and with a bounded or an infinite but fading memory. These equations represent a class of stochastic infinite-dimensional systems that become increasingly important and have wide range of applications in physics, chemistry, biology, engineering and economics/finance. This monograph can be used as a reference for those who have special interest in optimal control theory and applications of stochastic hereditary systems.
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**Stochastic Integration and Differential Equations** - Philip Protter - 2013-12-21

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, 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
semimartingales and stochastic integration. Thus 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.

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The content of this book is multidisciplinary by nature. It uses mathematical tools from the theories of probability and stochastic processes, partial differential equations, and asymptotic analysis, combined with the physics of wave propagation and modeling of time reversal experiments. It is addressed to a wide audience of graduate students and researchers interested in the intriguing phenomena related to waves propagating in random media. At the end of each chapter there is a section of notes where the authors give references and additional comments on the various results presented in the chapter.
Monte Carlo Methods in Financial Engineering - Paul Glasserman - 2013-03-09
From the reviews: "Paul Glasserman has written an astonishingly good book that bridges financial engineering and the Monte Carlo method. The book will appeal to graduate students, researchers, and most of all, practicing financial engineers [] So often, financial engineering texts are very theoretical. This book is not." --Glyn Holton, Contingency Analysis