Приклад. Нехай $\xi_k, k = 0, \infty$ - послідовність незалежних випадкових величин (білий шум).

$$\eta_t = \sum_{k=0}^t \xi_k, \quad t \in [0, \infty]$$

Прирости

$$\begin{split} &\eta_{t_2} - \eta_{t_1} = \sum_{k=0}^{t_2} \xi_k - \sum_{k=0}^{t_1} \xi_k = \sum_{k=t_1+1}^{t_2} \xi_k, \\ &\eta_{t_3} - \eta_{t_2} = \sum_{k=0}^{t_3} \xi_k - \sum_{k=0}^{t_2} \xi_k = \sum_{k=t_2+1}^{t_3} \xi_k, \end{split}$$

200

де
$$0 \le t_1 < t_2 < t_3 < \dots$$

Random Processes With Independent Increments

Mikhail Lifshits

Random Processes With Independent Increments:

Random Processes with Independent Increments Anatolii Vladimirovich Skorokhod, 1966 The book deals with the theory of random process with independent increment one of the most important branches of random process theory This represents the first collection of numerous important results obtained in the study of random processes with independent increments These results have been scattered through various articles The book will be of interest both for specialists in probability theory working in the field of random processes as well as for those studying the theory of random processes and concerned with its applications in various scientific fields Author Random Processes with Independent Increments A.V. Skorohod, 2012-09-27 One SCI ice mathematics bas rendered the Et moi si j avait su comment en revcnir je n y serais point aile human race It bas put common sc nsc back where it belongs on the topmost shelf next Jules Verne to the dusty canister labelled discarded n sense The series is divergent therefore we may be able to do something with it Eric T Bell O Hcavisido Mathematics is a tool for thought A highly necessary tool in a world where both feedback and non linearities abound Similarly all kinds of parts of mathematics serve as tools for other parts and for other sciences Applying a simple rewriting rule to the quote on the right above one finds such statements as One service topology has rendered mathematical physics One service logic has rendered com puter science One service category theory has rendered mathematics All arguably true Probability Theory and Mathematical And all statements obtainable this way form part of the raison d etre of this series Statistics Ibragimoc, 1996-09-01 First published in 1996 Routledge is an imprint of Taylor Francis an informa company

Introduction to the Theory of Random Processes Iosif Il?ich Gikhman, Anatoli? Vladimirovich Skorokhod, 1996-01-01 Rigorous exposition suitable for elementary instruction Covers measure theory axiomatization of probability theory processes with independent increments Markov processes and limit theorems for random processes more A wealth of results ideas and techniques distinguish this text Introduction Bibliography 1969 edition Probability and Random Processes Venkatarama Krishnan, 2015-08-03 The second edition enhanced with new chapters figures and appendices to cover the new developments in applied mathematical functions This book examines the topics of applied mathematical functions to problems that engineers and researchers solve daily in the course of their work The text covers set theory combinatorics random variables discrete and continuous probability distribution functions convergence of random variables computer generation of random variates random processes and stationarity concepts with associated autocovariance and cross covariance functions estimation theory and Wiener and Kalman filtering ending with two applications of probabilistic methods Probability tables with nine decimal place accuracy and graphical Fourier transform tables are included for quick reference The author facilitates understanding of probability concepts for both students and practitioners by presenting over 450 carefully detailed figures and illustrations and over 350 examples with every step explained clearly and some with multiple solutions Additional features of the second edition of Probability and Random Processes are Updated chapters with new sections on Newton

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Lévy Processes Ole E Barndorff-Nielsen, Thomas Mikosch, Sidney I. Resnick, 2012-12-06 A L vy process is a continuous time analogue of a random walk and as such is at the cradle of modern theories of stochastic processes Martingales Markov processes and diffusions are extensions and generalizations of these processes In the past representatives of the L vy class were considered most useful for applications to either Brownian motion or the Poisson process Nowadays the need for modeling jumps bursts extremes and other irregular behavior of phenomena in nature and society has led to a renaissance of the theory of general L vy processes Researchers and practitioners in fields as diverse as physics meteorology statistics insurance and finance have rediscovered the simplicity of L vy processes and their enormous flexibility in modeling tails dependence and path behavior This volume with an excellent introductory preface describes the state of the art of this rapidly evolving subject with special emphasis on the non Brownian world Leading experts present surveys of recent developments or focus on some most promising applications Despite its special character every topic is aimed at the non specialist keen on learning about the new exciting face of a rather aged class of processes An extensive bibliography at the end of each article makes this an invaluable comprehensive reference text For the researcher and graduate student every article contains open problems and points out directions for futurearch The accessible nature of the work makes this an ideal introductory text for graduate seminars in applied probability stochastic processes physics finance and telecommunications and a unique guide to the world of L vy processes The Theory of Stochastic Processes II I.I. Gikhman, A.V. Skorokhod, 2004-03-22 From the Reviews To call this work encyclopedic would not give an accurate picture of its content and style Some parts read like a textbook but others are more technical and contain relatively new results The exposition is robust and explicit as one has come to expect of the Russian tradition of mathematical writing K L Chung American Scientist 1977 An Introduction to Statistical Signal Processing Robert M. Gray, Lee D. Davisson, 2004-12-02 This book describes the essential tools and techniques of statistical signal processing At every stage theoretical ideas are linked to specific applications in communications and signal processing using a range of carefully chosen examples The book begins with a development of basic probability random objects expectation and second order moment theory followed by a wide variety of examples of the most popular random process models and their basic uses and properties Specific applications to the analysis of random signals and systems for communicating estimating detecting modulating and other processing of signals are interspersed throughout the book Hundreds of homework problems are included and the book is ideal for

graduate students of electrical engineering and applied mathematics It is also a useful reference for researchers in signal processing and communications Introduction to the Mathematics of Medical Imaging Charles L. Epstein, 2008-01-01 At the heart of every medical imaging technology is a sophisticated mathematical model of the measurement process and an algorithm to reconstruct an image from the measured data This book provides a firm foundation in the mathematical tools used to model the measurements and derive the reconstruction algorithms used in most imaging modalities in current use In the process it also covers many important analytic concepts and techniques used in Fourier analysis integral equations sampling theory and noise analysis This text uses X ray computed tomography as a pedagogical machine to illustrate important ideas and incorporates extensive discussions of background material making the more advanced mathematical topics accessible to readers with a less formal mathematical education. The mathematical concepts are illuminated with over 200 illustrations and numerous exercises New to the second edition are a chapter on magnetic resonance imaging MRI a revised section on the relationship between the continuum and discrete Fourier transforms a new section on Grangreat s formula an improved description of the gridding method and a new section on noise analysis in MRI Audience The book is appropriate for one or two semester courses at the advanced undergraduate or beginning graduate level on the mathematical foundations of modern medical imaging technologies The text assumes an understanding of calculus linear algebra and basic mathematical analysis Contents Preface to the Second Edition Preface How to Use This Book Notational Conventions Chapter 1 Measurements and Modeling Chapter 2 Linear Models and Linear Equations Chapter 3 A Basic Model for Tomography Chapter 4 Introduction to the Fourier Transform Chapter 5 Convolution Chapter 6 The Radon Transform Chapter 7 Introduction to Fourier Series Chapter 8 Sampling Chapter 9 Filters Chapter 10 Implementing Shift Invariant Filters Chapter 11 Reconstruction in X Ray Tomography Chapter 12 Imaging Artifacts in X Ray Tomography Chapter 13 Algebraic Reconstruction Techniques Chapter 14 Magnetic Resonance Imaging Chapter 15 Probability and Random Variables Chapter 16 Applications of Probability Chapter 17 Random Processes Appendix A Background Material Appendix B Basic Analysis Index **Random Processes by Example** Mikhail Lifshits, 2014 This volume first introduces the mathematical tools necessary for understanding and working with a broad class of applied stochastic models The toolbox includes Gaussian processes independently scattered measures such as Gaussian white noise and Poisson random measures stochastic integrals compound Poisson infinitely divisible and stable distributions and processes Next it illustrates general concepts by handling a transparent but rich example of a OC teletraffic modelOCO A minor tuning of a few parameters of the model leads to different workload regimes including Wiener process fractional Brownian motion and stable L r vy process The simplicity of the dependence mechanism used in the model enables us to get a clear understanding of long and short range dependence phenomena The model also shows how light or heavy distribution tails lead to continuous Gaussian processes or to processes with jumps in the limiting regime Finally in this volume readers will find discussions on the multivariate extensions that

admit a variety of completely different applied interpretations The reader will quickly become familiar with key concepts that form a language for many major probabilistic models of real world phenomena but are often neglected in more traditional courses of stochastic processes Sample Chapter's Chapter 1 Preliminaries 367 KB Contents Preliminaries Random Variables A Summary From Poisson to Stable Variables Limit Theorems for Sums and Domains of Attraction Random Vectors Random Processes Random Processes Main Classes Examples of Gaussian Random Processes Random Measures and Stochastic Integrals Limit Theorems for Poisson Integrals L r vy Processes Spectral Representations Convergence of Random Processes Teletraffic Models A Model of Service System Limit Theorems for the Workload Micropulse Model Spacial Extensions Readership Graduate students and researchers in probability statist Stochastic Models of Neural Networks Claudio Turchetti, 2004 This book is intended to provide a treatment of the theory and applications of Stochastic Neural Networks that is networks able to learn random processes from experience on the basis of recent developments on this subject The mathematical frameworks on which the theory is founded embrace the approximation of non random functions as well as the theory of stochastic processes The networks so defined constitute an original and very promising model of human brain neural activity consistent with the need of learning from a stochastic environment Moreover the problem of speech modeling both for synthesis and recognition is faced as concrete and significant application in the field of artificial intelligence of the theory is presented Scientific and Technical Aerospace Reports, 1968 Lists citations with abstracts for aerospace related reports obtained from world wide sources and announces documents that have recently been entered into the NASA Scientific and Technical Information Database Extracting Knowledge From Time Series Boris P. Bezruchko, Dmitry A. Smirnov, 2010-09-03 Mathematical modelling is ubiquitous Almost every book in exact science touches on mathematical models of a certain class of phenomena on more or less speci c approaches to construction and investigation of models on their applications etc As many textbooks with similar titles Part I of our book is devoted to general qu tions of modelling Part II re ects our professional interests as physicists who spent much time to investigations in the eld of non linear dynamics and mathematical modelling from discrete sequences of experimental measurements time series The latter direction of research is known for a long time as system identication in the framework of mathematical statistics and automatic control theory It has its roots in the problem of approximating experimental data points on a plane with a smooth curve Currently researchers aim at the description of complex behaviour irregular chaotic non stationary and noise corrupted signals which are typical of real world objects and phenomena with relatively simple non linear differential or difference model equations rather than with cumbersome explicit functions of time In the second half of the twentieth century it has become clear that such equations of a s ciently low order can exhibit non trivial solutions that promise suf ciently simple modelling of complex processes according to the concepts of non linear dynamics chaotic regimes can be demonstrated already by a third order non linear ordinary differential equation while complex behaviour in a linear model can be induced either by random in uence noise or by a very high order of equations NASA Technical Translation ,1969 Advanced Mathematical Tools for Automatic Control Engineers: Volume 2 Alexander S. Poznyak,2009-08-13 Advanced Mathematical Tools for Automatic Control Engineers Volume 2 Stochastic Techniques provides comprehensive discussions on statistical tools for control engineers The book is divided into four main parts Part I discusses the fundamentals of probability theory covering probability spaces random variables mathematical expectation inequalities and characteristic functions Part II addresses discrete time processes including the concepts of random sequences martingales and limit theorems Part III covers continuous time stochastic processes namely Markov processes stochastic integrals and stochastic differential equations Part IV presents applications of stochastic techniques for dynamic models and filtering prediction and smoothing problems It also discusses the stochastic approximation method and the robust stochastic maximum principle Provides comprehensive theory of matrices real complex and functional analysis Provides practical examples of modern optimization methods that can be effectively used in variety of real world applications Contains worked proofs of all theorems and propositions presented

Statistical Diagnostics of Electric Power Equipment Vitalii Babak, Sergii Babak, Artur Zaporozhets, 2024-11-25 This book considers the issues of constructing mathematical probabilistic models of diagnostic signals the development of statistical methods of their analysis in order to make diagnostic decisions and finally the technical implementation of the proposed diagnostic methods Following the concept of primacy of the mathematical model of the diagnostic signal the authors considered it expedient to consider first of all the questions connected with the theory of random processes possessing infinitely divisible distribution laws linear and linear periodic random processes Considerable attention is paid to the issues of simulation modeling of diagnostic signals and their statistical evaluation Modern element base and new information technologies allowed to develop build and practically test a number of experimental samples of information measuring systems of statistical diagnostics of electric power engineering objects Among these IMS the systems are realized by means of unmanned diagnostic complexes and also IMS of vibrodiagnostics of moving units of electric machines represents an important role A large amount of experimental research has shown the operability and efficiency of the built IMS samples Particular attention is paid to the selection of diagnostic spaces formation of training sets construction of solving rules for diagnosis and classification of EE defects The authors do not pretend to a comprehensive consideration of the issues of EE diagnostics using statistical methods and IMS realized on their basis At the same time the results of researches stated in this monograph were a natural continuation of the subject of application of statistical methods in the field of control monitoring and diagnostics for objects of electric power industry Systems, Decision and Control in Energy VI Vitalii Babak, Artur Zaporozhets, 2024-09-21 In an era marked by escalating energy demands and imperatives of environmental stewardship this compendium serves as a comprehensive exploration of the multifaceted dimensions shaping contemporary energy development with a focal lens on the symbiotic relationship between energy information and transportation systems The

canvas of 2023 s energy evolution is painted against the backdrop of heightened consciousness surrounding climate change and environmental degradation This epoch witnesses an unyielding momentum toward sustainability catalyzed by a profound shift in energy sourcing paradigms Renewable energy sources solar wind hydro and beyond attain unprecedented prominence not merely as alternative energy options but as linchpins of a redefined energy matrix fostered by advancements in technology economics and scalability At the nexus of this transformative energy landscape lies the realm of Energy Informatics a domain where information technologies converge with energy systems Smart grids IoT enabled devices data analytics and artificial intelligence orchestrate a symphony of efficiency and optimization revolutionizing energy management demand response dynamics and grid resilience The fusion of information technology and energy infrastructures stands poised to usher in an era of unprecedented interconnectivity and adaptability Transportation an indispensable facet of the energy ecosystem undergoes a metamorphosis in 2023 Electrification hydrogen powered vehicles and advancements in sustainable fuels reimagine mobility paradigms heralding a transition toward greener more efficient transportation systems The synergy between energy and transportation facilitated by data driven insights and technological innovations propels the convergence of these domains toward a more sustainable future Moreover the global socio political landscape assumes paramount significance in shaping the contours of energy dynamics Geopolitical considerations international collaborations and policy frameworks delineate the trajectory of energy infrastructure investments trade patterns and the realization of sustainable energy transitions on a global scale Yet within the narrative of progress challenges persist Legacy infrastructures regulatory complexities socio economic disparities and the imperative of inclusive transitions underscore the complexities inherent in reshaping the energy and transportation landscapes Models and Measures in Measurements and Monitoring Vitaliy P. Babak, Serhii V. Babak, Volodymyr S. Eremenko, Yurii V. Kuts, Mykhailo V. Myslovych, Leonid M. Scherbak, Artur O. Zaporozhets, 2021-04-19 This book examines modern methods of creating models and measures in measurements physical and probabilistic measures models spaces and bases of signals and fields deterministic and probabilistic models and measures of angular quantities Examples of their use on a circle and in phase measurements are given models and measures for diagnostics in the electric power industry in standardless measurements of the characteristics of composite materials in environmental pollution monitoring systems also with using unmanned aerial vehicles are considered Most of the presented results were obtained on the basis of the Institute of Engineering Thermophysics of National Academy of Sciences of Ukraine The book is intended for researchers engineers as well as lecturers graduate students and students of higher educational institutions dealing with the problems of measurements monitoring and diagnostics of complex technical objects Stochastic Processes in Physics and Chemistry N.G. Van Kampen, 1992-11-20 This new edition of Van Kampen's standard work has been completely revised and updated Three major changes have also been made The Langevin equation receives more attention in a separate chapter in which non Gaussian

and colored noise are introduced Another additional chapter contains old and new material on first passage times and related subjects which lay the foundation for the chapter on unstable systems Finally a completely new chapter has been written on the quantum mechanical foundations of noise The references have also been expanded and updated Introduction to the Theory and Applications of Functional Differential Equations V. Kolmanovskii, A. Myshkis, 2013-04-18 This book covers the most important issues in the theory of functional differential equations and their applications for both deterministic and stochastic cases Among the subjects treated are qualitative theory stability periodic solutions optimal control and estimation the theory of linear equations and basic principles of mathematical modelling The work which treats many concrete problems in detail gives a good overview of the entire field and will serve as a stimulating guide to further research Audience This volume will be of interest to researchers and post graduate students working in analysis and in functional analysis in particular It will also appeal to mathematical engineers industrial mathematicians mathematical system theoreticians and mathematical modellers

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Random Processes With Independent Increments Introduction

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