Introduction To Probability Bertsekas Additional Problems Solutions

An introduction to probability at the

undergraduate level Chance and randomness are encountered on a daily basis. Authoredby a highly qualified professor in the field, Probability: WithApplications and R delves into the theories and applicationsessential to obtaining a

thorough understanding of probability. With real-life examples and thoughtful exercises from fields asdiverse as biology, computer science, cryptology, ecology, publichealth, and sports, the book is accessible for a variety ofreaders. The book’s emphasis on

simulation through the use ofthe popular R software language clarifies and illustrates keycomputational and theoretical results. Probability: With Applications and R helps readersdevelop problem-solving skills and delivers an appropriate mix oftheory and

application. The book includes: Chapters covering first principles, conditional probability,independent trials, random variables, discrete distributions,continuous probability, continuous distributions, conditionaldistribution, and limits An early

introduction to random variables and Monte Carlosimulation and an emphasis on conditional probability ,conditioning, and developing probabilistic intuition An R tutorial with example script files Many classic and historical problems of

probability as well asnontraditional material, such as Benford's law, power-lawdistributions, and Bayesian statistics A topics section with suitable material for projects andexplorations, such as random walk on graphs, Markov chains, andMarkov

chain Monte Carlo Chapter-by-chapter summaries and hundreds of practicalexercises Probability: With Applications and R is an ideal text fora beginning course in probability at the undergraduate level. The significantly expanded and updated

new edition of a widely used text on reinforcement learning, one of the most active research areas in artificial intelligence. Reinforcement learning, one of the most active research areas in artificial intelligence, is a computational

approach to learning whereby an agent tries to maximize the total amount of reward it receives while interacting with a complex, uncertain environment. In Reinforcement Learning, Richard Sutton and Andrew Barto provide a clear and simple account of

the field's key ideas and algorithms. This second edition has been significantly expanded and updated, presenting new topics and updating coverage of other topics. Like the first edition, this second edition focuses on core online learning algorithms,

with the more mathematical material set off in shaded boxes. Part I covers as much of reinforcement learning as possible without going beyond the tabular case for which exact solutions can be found. Many algorithms presented in this part are new to

the second edition, including UCB, Expected Sarsa, and Double Learning. Part II extends these ideas to function approximation, with new sections on such topics as artificial neural networks and the Fourier basis, and offers expanded treatment of off-policy

learning and policy-gradient methods. Part III has new chapters on reinforcement learning's relationships to psychology and neuroscience, as well as an updated case-studies chapter including AlphaGo and AlphaGo Zero, Atari game playing,

and IBM Watson's wagering strategy. The final chapter discusses the future societal impacts of reinforcement learning.

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

This is the 3rd edition of a research monograph providing a synthesis of old research on the foundations of dynamic programming (DP), with the modern theory of approximate DP and new research on semicontractive models. It aims at a

unified and economical development of the core theory and algorithms of total cost sequential decision problems, based on the strong connections of the subject with fixed point theory. The analysis focuses on the abstract mapping

that underlies DP and defines the mathematical character of the associated problem. The discussion centers on two fundamental properties that this mapping may have: monotonicity and (weighted sup-norm) contraction. It turns out that the nature of

the analytical and algorithmic DP theory is determined primarily by the presence or absence of these two properties, and the rest of the problem's structure is largely inconsequential. New research is focused on two areas: 1) The ramifications of these

properties in the context of algorithms for approximate DP, and 2) The new class of semicontractive models, exemplified by stochastic shortest path problems, where some but not all policies are contractive. The 3rd edition is very similar to the 2nd edition,

except for the addition of a new chapter (Chapter 5), which deals with abstract DP models for sequential minimax problems and zero-sum games, The book is an excellent supplement to several of our books: Neuro-Dynamic Programming (Athena

Scientific, 1996), Dynamic Programming and Optimal Control (Athena Scientific, 2017), Reinforcement Learning and Optimal Control (Athena Scientific, 2019), and Rollout, Policy Iteration, and Distributed Reinforcement

Learning (Athena Scientific, 2020).

Elementary Probability

Probability Distributions Used in Reliability Engineering

How Claude Shannon Invented the Information Age

The Science of Uncertainty

The Lasso and Generalizations

This market-leading introduction to probability features exceptionally clear explanations of the mathematics of probability theory and explores its many diverse

applications through numerous interesting and motivational examples. The outstanding problem sets are a hallmark feature of this book. Provides clear, complete explanations to fully explain

mathematical concepts. Features subsections on the probabilistic method and the m aximum-minimums identity. Includes many new examples relating to DNA matching, utility, finance, and

applications of the probabilistic method. Features an intuitive treatment of proba bility—intuitive explanations follow many examples. The Probability Models Disk included with each copy of the book,

contains six probability models that are referenced in the book and allow readers to quickly and easily perform calculations and simulations.
An overview of the rapidly growing field of ant colony

optimization that describes theoretical findings, the major algorithms, and current applications. The complex social behaviors of ants have been much studied by science, and

computer scientists are now finding that these behavior patterns can provide models for solving difficult combinatorial optimization problems. The attempt to develop algorithms inspired

by one aspect of ant behavior, the ability to find what computer scientists would call shortest paths, has become the field of ant colony optimization (ACO), the most successful and widely recognized

algorithmic technique based on ant behavior. This book presents an overview of this rapidly growing field, from its theoretical inception to practical applications, including

descriptions of many available ACO algorithms and their uses. The book first describes the translation of observed ant behavior into working optimization algorithms. The

ant colony metaheuristic is then introduced and viewed in the general context of combinatorial optimization. This is followed by a detailed description and guide to all major ACO algorithms

and a report on current theoretical findings. The book surveys ACO applications now in use, including routing, assignment, scheduling, subset, machine learning, and bioinformatics

problems. AntNet, an ACO algorithm designed for the network routing problem, is described in detail. The authors conclude by summarizing the progress in the field and outlining future research

directions. Each chapter ends with bibliographic material, bullet points setting out important ideas covered in the chapter, and exercises. Ant Colony Optimization will be of interest to

academic and industry researchers, graduate students, and practitioners who wish to learn how to implement ACO algorithms. This book considers large and challenging multistage decision

problems, which can be solved in principle by dynamic programming (DP), but their exact solution is computationally intractable. We discuss solution methods that rely on approximations

to produce suboptimal policies with adequate performance. These methods are collectively known by several essentially equivalent names: reinforcement learning, approximate

dynamic programming, neuro-dynamic programming. They have been at the forefront of research for the last 25 years, and they underlie, among others, the recent impressive successes of self-

learning in the context of games such as chess and Go. Our subject has benefited greatly from the interplay of ideas from optimal control and from artificial intelligence, as it relates to

reinforcement learning and simulation-based neural network methods. One of the aims of the book is to explore the common boundary between these two fields and to form a bridge that is

accessible by workers with background in either field. Another aim is to organize coherently the broad mosaic of methods that have proved successful in practice while having a solid

theoretical and/or logical foundation. This may help researchers and practitioners to find their way through the maze of competing ideas that constitute the current state of the art. This book relates to several

of our other books: Neuro-Dynamic Programming (Athena Scientific, 1996), Dynamic Programming and Optimal Control (4th edition, Athena Scientific, 2017), Abstract Dynamic Programming (2nd

edition, Athena Scientific, 2018), and Nonlinear Programming (Athena Scientific, 2016). However, the mathematical style of this book is somewhat different. While we provide a rigorous, albeit short,

mathematical account of the theory of finite and infinite horizon dynamic programming, and some fundamental approximation methods, we rely more on intuitive explanations and less on proof-

based insights. Moreover, our mathematical requirements are quite modest: calculus, a minimal use of matrix-vector algebra, and elementary probability (mathematically complicated

arguments involving laws of large numbers and stochastic convergence are bypassed in favor of intuitive explanations). The book illustrates the methodology with many examples and illustrations,

and uses a gradual expository approach, which proceeds along four directions: (a) From exact DP to approximate DP: We first discuss exact DP algorithms, explain why they may be difficult to

implement, and then use them as the basis for approximations.
(b) From finite horizon to infinite horizon problems: We first discuss finite horizon exact and approximate DP methodologies, which are intuitive

and mathematically simple, and then progress to infinite horizon problems.
(c) From deterministic to stochastic models: We often discuss separately deterministic and stochastic

problems, since deterministic problems are simpler and offer special advantages for some of our methods. (d) From model-based to model-free implementations: We first discuss

model-based implementations, and then we identify schemes that can be appropriately modified to work with a simulator. The book is related and supplemented by the companion

research monograph Rollout, Policy Iteration, and Distributed Reinforcement Learning (Athena Scientific, 2020), which focuses more closely on several topics related to rollout,

approximate policy iteration, multiagent problems, discrete and Bayesian optimization, and distributed computation, which are either discussed in less detail or not covered at all in

the present book. The author's website contains class notes, and a series of videolectures and slides from a 2021 course at ASU, which address a selection of topics from both books. Probability and

Measure Theory, Second Edition, is a text for a graduate-level course in probability that includes essential background topics in analysis. It provides extensive coverage of conditional

probability and expectation, strong laws of large numbers, martingale theory, the central limit theorem, ergodic theory, and Brownian motion. Clear, readable style Solutions to many problems

presented in text Solutions manual for instructors Material new to the second edition on ergodic theory, Brownian motion, and convergence theorems used in statistics No knowledge of general topology

required, just basic analysis and metric spaces Efficient organization Convex Optimization Theory Abstract Dynamic Programming Reinforcement Learning, second

edition

Ant Colony Optimization

From Theory to Algorithms

Discover New Methods for Dealing with High-Dimensional Data A sparse statistical model has only a small number of

nonzero parameters or weights; therefore, it is much easier to estimate and interpret than a dense model. Statistical Learning with Sparsity: The Lasso and Generalizations presents methods that exploit sparsity to help recover the

underlying signal in a set of data. Top experts in this rapidly evolving field, the authors describe the lasso for linear regression and a simple coordinate descent algorithm for its computation. They discuss the application of l1 penalties to

generalized linear models and support vector machines, cover generalized penalties such as the elastic net and group lasso, and review numerical methods for optimization. They also present statistical inference methods for fitted (lasso) models,

including the bootstrap, Bayesian methods, and recently developed approaches. In addition, the book examines matrix decomposition, sparse multivariate analysis, graphical models, and compressed sensing. It concludes with a

survey of theoretical results for the lasso. In this age of big data, the number of features measured on a person or object can be large and might be larger than the number of observations. This book shows how the sparsity assumption allows us to tackle

these problems and extract useful and reproducible patterns from big datasets. Data analysts, computer scientists, and theorists will appreciate this thorough and up-to-date treatment of sparse statistical modeling.

The core of this paper is a general set of variational principles for the problems of computing marginal probabilities and modes, applicable to multivariate statistical models in the exponential family.

An insightful,

concise, and rigorous treatment of the basic theory of convex sets and functions in finite dimensions, and the analytical/geometric al foundations of convex optimization and duality theory. Convexity theory is first developed in a simple accessible

manner, using easily visualized proofs. Then the focus shifts to a transparent geometrical line of analysis to develop the fundamental duality between descriptions of convex functions in terms of points, and in terms of hyperplanes. Finally,

convexity theory and abstract duality are applied to problems of constrained optimization, Fenchel and conic duality, and game theory to develop the sharpest possible duality results within a highly visual geometric framework. This on-

line version of the book, includes an extensive set of theoretical problems with detailed high-quality solutions, which significantly extend the range and value of the book. The book may be used as a text for a theoretical convex optimization course;

the author has taught several variants of such a course at MIT and elsewhere over the last ten years. It may also be used as a supplementary source for nonlinear programming classes, and as a theoretical foundation for

classes focused on convex optimization models (rather than theory). It is an excellent supplement to several of our books: Convex Optimization Algorithms (Athena Scientific, 2015), Nonlinear Programming (Athena Scientific,

2017), Network Optimization(Athena Scientific, 1998), Introduction to Linear Optimization (Athena Scientific, 1997), and Network Flows and Monotropic Optimization (Athena Scientific, 1998).

Linear Network

Optimization presents a thorough treatment of classical approaches to network problems such as shortest path, max-flow, assignment, transportation, and minimum cost flow problems.

An Introduction Understanding

Machine Learning
Stochastic-Process Limits
Introduction to Probability, Statistics, and Random Processes
Algorithms and Codes

Developed from celebrated Harvard statistics lectures,

Introduction to Probability provides essential language and tools for understanding statistics, randomness, and uncertainty. The book explores a wide variety of applications and examples, ranging from coincidences and paradoxes to

Google PageRank and Markov chain Monte Carlo (MCMC). Additional application areas explored include genetics, medicine, computer science, and information theory. The authors present the material in an accessible style

and motivate concepts using real-world examples. Throughout, they use stories to uncover connections between the fundamental distributions in statistics and conditioning to reduce complicated

problems to manageable pieces. The book includes many intuitive explanations, diagrams, and practice problems. Each chapter ends with a section showing how to perform relevant simulations and calculations in R, a

free statistical software environment. The second edition adds many new examples, exercises, and explanations, to deepen understanding of the ideas, clarify subtle concepts, and respond to feedback from

many students and readers. New supplementary online resources have been developed, including animations and interactive visualizations, and the book has been updated to dovetail with these resources.

Supplementary material is available on Joseph Blitzstein's website www. stat110.net. The supplements include: Solutions to selected exercises Additional practice problems Handouts including review material and

sample exams Animations and interactive visualizations created in connection with the edX online version of Stat 110. Links to lecture videos available on ITunes U and YouTube There is also a complete

instructor's solutions manual available to instructors who require the book for a course. From the reviews: "The material is self-contained, but it is technical and a solid foundation in probability and queuing theory is beneficial to

prospective readers. [... It] is intended to be accessible to those with less background. This book is a must to researchers and graduate students interested in these areas." ISI Short Book Reviews

An accessible undergraduate

textbook introducing key fundamental principles behind modern communication systems, supported by exercises, software problems and lab exercises. A self-study guide for practicing engineers, scientists, and

students, this book offers practical, worked-out examples on continuous and discrete probability for problem-solving courses. It is filled with handy diagrams, examples, and solutions that greatly aid in the

comprehension of a variety of probability problems.

Probability in Physics

With Applications and R

Head First Statistics

A Mind at Play

An Introduction to Statistical Signal Processing

Unlike traditional introductory math/stat textbooks, Probability and Statistics: The Science of Uncertainty brings a modern flavor based on

incorporating the computer to the course and an integrated approach to inference. From the start the book integrates simulations into its

theoretical coverage, and emphasizes the use of com puter-powered computation throughout.* Math and science majors with just one year of calculus can

use this text and experience a refreshing blend of applications and theory that goes beyond merely mastering the technicalities. They'll get a

thorough grounding in probability theory, and go beyond that to the theory of statistical inference and its applications. An integrated approach to

inference is presented that includes the frequency approach as well as Bayesian methodology. Bayesian inference is developed as a logical

extension of likelihood methods. A separate chapter is devoted to the important topic of model checking and this is applied in the context of the

standard applied statistical techniques. Examples of data analyses using real-world data are presented throughout the text. A final chapter

introduces a number of the most important stochastic process models using elementary methods. *Note: An appendix in the book

contains Minitab code for more involved computations. The code can be used by students as templates for their own calculations. If a software

package like Minitab is used with the course then no programming is required by the students. A comprehensive introduction to machine learning that

uses probabilistic models and inference as a unifying approach. Today's Web-enabled deluge of electronic data calls for automated

methods of data analysis. Machine learning provides these, developing methods that can automatically detect patterns in

data and then use the uncovered patterns to predict future data. This textbook offers a comprehensive and self-contained introduction to

the field of machine learning, based on a unified, probabilistic approach. The coverage combines breadth and depth, offering

necessary background material on such topics as probability, optimization, and linear algebra as well as discussion of recent developments

in the field, including conditional random fields, L1 regularization, and deep learning. The book is written in an informal, accessible style,

complete with pseudo-code for the most important algorithms. All topics are copiously illustrated with color images and worked examples

drawn from such application domains as biology, text processing, computer vision, and robotics. Rather than providing a cookbook of

different heuristic methods, the book stresses a principled model-based approach, often using the language of graphical models to specify models

in a concise and intuitive way. Almost all the models described have been implemented in a MATLAB software pack age—PMTK (probabilistic modeling

toolkit)—that is freely available online. The book is suitable for upper-level un dergraduates with an introd uctory-level college math background

and beginning graduate students.

A comprehensive introduction to the tools, techniques and applications of convex optimization.

This is a text for a one-quarter or one-semester course in probability, aimed at students who have done a year of calculus. The book is

organised so a student can learn the fundamental ideas of probability from the first three chapters without reliance on calculus. Later chapters

develop these ideas further using calculus tools. The book contains more than the usual number of examples worked out in detail. The most valuable thing for

students to learn from a course like this is how to pick up a probability problem in a new setting and relate it to the standard body of theory. The

more they see this happen in class, and the more they do it themselves in exercises, the better. The style of the text is deliberately informal. My experience is

that students learn more from intuitive explanations, diagrams, and examples than they do from theorems and proofs. So the emphasis is on problem solving rather

than theory. Introduction to Communication Systems Reinforcement Learning and Optimal Control Probability Mathematics for Machine Learning

Statistical Learning with Sparsity

Developed from celebrated Harvard statistics lectures, Introduction to Probability provides essential language and tools for understanding statistics, randomness,

and uncertainty. The book explores a wide variety of applications and examples, ranging from coincidences and paradoxes to Google PageRank and Markov chain Monte Carlo (MCMC). Additional

The book covers basic concepts such as

random experiments, probability axioms, conditional probability, and counting methods, single and multiple random variables (discrete, continuous, and mixed), as well as moment-generating functions, characteristic functions, random

vectors, and inequalities; limit theorems and convergence; introduction to Bayesian and classical statistics; random processes including processing of random signals, Poisson processes, discrete-time and continuous-time

Markov chains, and Brownian motion; simulation using MATLAB and R. Probability is an area of mathematics of tremendous contemporary importance across all aspects of human endeavour. This book is a compact account of the basic features

of probability and random processes at the level of first and second year mathematics undergraduates and Masters' students in cognate fields. It is suitable for a first course in probability, plus a follow-up course in random processes including

Markov chains. A special feature is the authors' attention to rigorous mathematics: not everything is rigorous, but the need for rigour is explained at difficult junctures. The text is enriched by simple exercises, together with problems (with very brief hints) many

of which are taken from final examinations at Cambridge and Oxford. The first eight chapters form a course in basic probability, being an account of events, random variables, and distributions - discrete and continuous random

variables are treated separately - together with simple versions of the law of large numbers and the central limit theorem. There is an account of moment generating functions and their applications. The following three chapters are about branching processes,

random walks, and continuous-time random processes such as the Poisson process. The final chapter is a fairly extensive account of Markov chains in discrete time. This second edition develops the success of the first edition through an updated

presentation, the extensive new chapter on Markov chains, and a number of new sections to ensure comprehensive coverage of the syllabi at major universities.

A comprehensive and rigorous introduction for graduate students and researchers, with

applications in sequential decision-making problems.

A Brain-Friendly Guide

Markov Chains and Stochastic Stability

Probability and Statistics

Head First 2D Geometry

An Introduction to Stochastic-Process

Limits and Their Application to Queues

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.
Presents the basic principles of planar geometry in easy-to-understand terms, including

information on polygons, triangle properties, and the Pythagorean Theorem. -- The standard rules of probability can be interpreted as uniquely valid principles in logic. In this book, E. T. Jaynes dispels the

imaginary distinction between 'probability theory' and 'statistical inference', leaving a logical unity and simplicity, which provides greater technical power and flexibility in applications. This

book goes beyond the conventional mathematics of probability theory, viewing the subject in a wider context. New results are discussed, along with applications of probability theory to a wide variety of problems in

physics, mathematics, economics, chemistry and biology. It contains many exercises and problems, and is suitable for use as a textbook on graduate level courses involving data analysis. The

material is aimed at readers who are already familiar with applied mathematics at an advanced undergraduate level or higher. The book will be of interest to scientists working in any area where

inference from incomplete information is necessary. Introduces machine learning and its algorithmic paradigms, explaining the principles behind automated learning

approaches and the considerations underlying their usage.

Statistics and Random Processes

A First Course in Probability

Machine Learning

Probability and Measure Theory

The Probability Tutoring Book

The book provides details on 22 probability distributions. Each distribution section provides a graphical visualization and formulas for distribution

parameters, along with distribution formulas. Common statistics such as moments and percentile formulas are followed by likelihood functions and in many cases the derivation of maximum likelihood

estimates. Bayesian non-informative and conjugate priors are provided followed by a discussion on the distribution characteristics and applications in reliability engineering.

New up-to-date edition of this influential classic on Markov chains in general state spaces. Proofs are rigorous and concise, the range of applications is broad and knowledgeable, and key ideas are

accessible to practitioners with limited mathematical background. New commentary by Sean Meyn, including updated references, reflects developments since 1996.
"The third edition

earmarks the great success of this text among the students as well as the teachers. To enhance its utility one additional appendix on "The Theory of Errors" has been incorporated along with necessary

modifications and corrections in the text. The treatment, as before, is rigorous yet impressively elegant and simple. The special feature of this text is its effort to resolve many outstanding

confusions of probability and statistics. This will undoubtedly continue to be a valuable companion for all those pursuing a career in Statistics."--BOOK JACKET.
A comprehensive

introduction to statistics that teaches the fundamentals with real-life scenarios, and covers histograms, quartiles, probability, Bayes' theorem, predictions, approximations,

random samples, and related topics. Introduction to Counting and Probability Probability Theory The Logic of Science Graphical Models, Exponential Families, and Variational

Inference

Bandit Algorithms

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. What is the role and meaning of probability in physical theory, in particular in two of the most successful theories of our age,

quantum physics and statistical mechanics? Laws once conceived as universal and deterministic, such as Newton ‘ s laws of motion, or the second law of thermodynamics, are replaced in these theories by

inherently probabilistic laws. This collection of essays by some of the world ' s foremost experts presents an in-depth analysis of the meaning of probability in contemporary physics. Among the questions addressed

are: How are probabilities defined? Are they objective or subjective? What is their explanatory value? What are the differences between quantum and classical probabilities? The result is an

informative and thought-provoking book for the scientifically inquisitive.
Winner of the Neumann Prize for the History of Mathematics "We owe Claude Shannon a lot, and Soni & Goodman ' s

book takes a big first step in paying that debt." —San Francisco Review of Books "Soni and Goodman are at their best when they invoke the wonder an idea can instill. They summon the right level of awe while stopping short

of hyperbole." —Financial Times "Jimmy Soni and Rob Goodman make a convincing case for their subtitle while reminding us that Shannon never made this claim himself." —The Wall Street Journal “ A charming

account of one of the twentieth century ' s most distinguished scientists···Readers will enjoy this portrait of a modern-day Da Vinci. " —Fortune In their second collaboration, biographers Jimmy Soni and Rob

Goodman present the story of Claude Shannon—one of the foremost intellects of the twentieth century and the architect of the Information Age, whose insights stand behind every computer built, email sent, video

streamed, and webpage loaded. Claude Shannon was a groundbreaking polymath, a brilliant tinkerer, and a digital pioneer. He constructed the first wearable computer, outfoxed Vegas casinos, and built

juggling robots. He also wrote the seminal text of the digital revolution, which has been called “ the Magna Carta of the Information Age. ” In this elegantly written, exhaustively researched biography, Soni and

Goodman reveal Claude Shannon ' s full story for the first time. With unique access to Shannon ' s family and friends, A Mind at Play brings this singular innovator and always playful genius to life.

Now available in a

fully revised and updated second edition, this well established textbook provides a straightforward introduction to the theory of probability. The presentation is entertaining without any sacrifice of rigour; important

notions are covered with the clarity that the subject demands. Topics covered include conditional probability, independence, discrete and continuous random variables, basic combinatorics, generating functions

and limit theorems, and an introduction to Markov chains. The text is accessible to undergraduate students and provides numerous worked examples and exercises to help build the important skills necessary for problem solving.

An Intuitive Course for Engineers and Scientists (and Everyone Else!)
Introduction to Probability, Second Edition
Convex Optimization
A Probabilistic Perspective
Introduction to

Probability

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.

This classroom-tested textbook is an introduction to probability theory, with the right balance between mathematical precision,

probabilistic intuition, and concrete applications. Introduction to Probability covers the material precisely, while avoiding excessive technical details. After

introducing the basic vocabulary of randomness, including events, probabilities, and random variables, the text offers the reader a first glimpse of the major theorems

of the subject: the law of large numbers and the central limit theorem. The important probability distributions are introduced organically as they arise from applications. The discrete

and continuous sides of probability are treated together to emphasize their similarities. Intended for students with a calculus background, the text teaches not only the

nuts and bolts of probability theory and how to solve specific problems, but also why the methods of solution work. 3rd Edition Linear Network Optimization