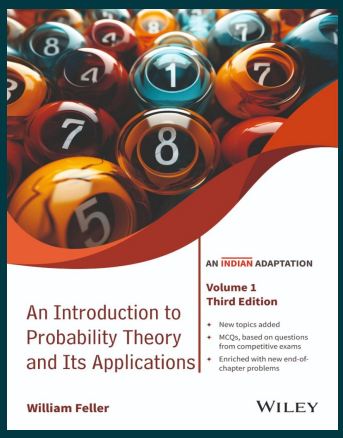
WILEY



An Introduction to Probability Theory and Its Applications, Vol. 1, 3ed , An Indian Adaptation

By William Feller

Paperback 9789363868496 ₹1,155.00

Pages: 524

Description

An Introduction to Probability Theory and Its Applications uniquely blends a comprehensive overview of probability theory with the real-world application of that theory. The book's comprehensive approach provides a complete view of theory along with enlightening examples along the way. This Indian edition enhances the coverage with new and updated content. It introduces new sections on modern approach to probability theory, limitations of frequentist probability definition, Lindeberg- Lévy central limit theorem, and infinite sequence of random variables and different modes of convergence. Additionally, a new appendix , featuring simplified real-world examples using R software, has been added. Many end-of-chapter problems throughout the book are new or revised. It also includes multiple-choice questions derived from various competitive examinations.

About the Author

William Feller

William "Vilim" Feller worked on mathematical probability using Kolmogorov's measure theoretic formulation. His approach was pure mathematical, but he did study applications of probability, particularly to genetics. He transformed the relation between Markov processes and partial differential equations. Later he put his results in a functional analysis framework. Feller made notable contributions to the mathematical theory of Brownian motion and diffusion processes during the years 1930-1960.

Table of Contents

Introduction: The Nature of Probability Theory
1. The Background
2. Procedure
3. "Statistical" Probability
4. Modern Approach to Probability
5. Summary
6. Historical Note
I The Sample Space
1. The Empirical Background
2. Examples
3. The Sample Space. Events
4. Relations Among Events
5. Discrete Sample Spaces
6. Probabilities in Discrete Sample Spaces: Preparations
7. The Basic Definitions and Rules
8. Limitations of the Frequentist Definition
9. Summary
10. Problems for Solution
11. Multiple Choice Questions
II Elements of Combinatorial Analysis
1. Preliminaries
2. Ordered Samples
3. Examples
4. Subpopulations and Partitions
*5. Application to Occupancy Problems
6. The Hypergeometric Distribution
7. Examples for Waiting Times
8. Binomial Coefficients
9. Stirling's Formula
10. Summary
11. Problems for Solution
12. Exercises and Examples
13. Problems and Complements of a Theoretical Character
14. Problems and Identities Involving Binomial Coefficients
15. Multiple Choice Questions
*III Fluctuations in Coin Tossing and Random Walks
1. General Orientation. The Reflection Principle
2. Random Walks: Basic Notions and Notations
3. The Main Lemma
4. Last Visit and Long Leads
*5. Changes of Sign
6. An Experimental Illustration
7. Maxima and First Passages
8. Duality. Position of Maxima
9. An Equidistribution Theorem
10. Summary
11. Problems for Solution
12. Multiple Choice Questions
*IV Combination of Events
1. Union of Events
2. Application to the Classical Occupancy Problem
3. The Realization of m Among N Events
4. Application to Matching and Guessing
5. Miscellany
6. Summary
7. Problems for Solution
8. Multiple Choice Questions
V Conditional Probability. Stochastic Independence
1. Conditional Probability
2. Probabilities Defined by Conditional Probabilities. Urn Models
3. Stochastic Independence
4. Product Spaces. Independent Trials
*5. Applications to Genetics
*6. Sex-Linked Characters
*7. Selection
8. Summary
9. Problems for Solution
10. Multiple Choice Questions
VI The Binomial and the Poisson Distributions
1. Bernoulli Trials
2. The Binomial Distribution
3. The Central Term and the Tails
4. The Law of Large Numbers
5. The Poisson Approximation
6. The Poisson Distribution
7. Observations Fitting the Poisson Distribution
8. Waiting Times. The Negative Binomial Distribution
9. The Multinomial Distribution
10. Summary
11. Problems for Solution
12. Multiple Choice Questions
VII The Normal Approximation to the Binomial Distribution
1. The Normal Distribution
2. Orientation: Symmetric Distributions
3. The DeMoivre-Laplace Limit Theorem
4. Examples
5. Lindeberg-Lévy Central Limit Theorem
6. Relation to the Poisson Approximation
7. Large Deviations
8. Summary
9. Problems for Solution
10. Multiple Choice Questions
*VIII Unlimited Sequences of Bernoulli Trials
1. Infinite Sequences of Trials
2. Systems of Gambling
3. The Borel-Cantelli Lemmas
4. The Strong Law of Large Numbers
5. The Law of the Iterated Logarithm
6. Interpretation in Number Theory Language
7. Summary
8. Problems for Solution
9. Multiple Choice Questions
IX Random Variables; Expectation
1. Random Variables
2. Expectations
3. Examples and Applications
4. The Variance
5. Covariance; Variance of a Sum
6. Chebyshev's Inequality
*7. Kolmogorov's Inequality
*8. The Correlation Coefficient
9. Infinite Sequence of Random Variables and Different Modes of Convergence
10. Summary
11. Problems for Solution
12. Multiple Choice Questions
X Law of Large Numbers
1. Independent Random Variables
*2. Proof of the Law of Large Numbers
3. The Theory of "Fair" Games
*4. The Petersburg Game
5. Variable Distributions
*6. Applications to Combinatorial Analysis
*7. The Strong Law of Large Numbers
8. Summary
9. Problems for Solution
10. Multiple Choice Questions
XI Integral-Valued Variables. Generating Functions
1. Generalities
2. Convolutions
3. Equidistance and Waiting Times in Bernoulli Trials
4. Partial Fraction Expansions
5. Examples for Generating Functions
*6. The Continuity Theorem
7. Summary
8. Problems for Solution
9. Multiple Choice Questions
*XII Compound Distributions. Branching Processes
1. Sums of a Random Number of Variables
2. The Compound Poisson Distribution
3. Examples for Branching Processes
4. Extinction Probabilities in Branching Processes
5. The Total Progeny in Branching Processes
6. Summary
7. Problems for Solution
8. Multiple Choice Questions
XIII Recurrent Events. Renewal Theory
1. Informal Preparations and Examples
2. Definitions
3. The Basic Relations
4. Examples
5. Delayed Recurrent Events. A General Limit Theorem
6. The Number of Occurrences of E
*7. Application to the Theory of Success Runs
*8. More General Patterns
9. Lack of Memory of Geometric Waiting Times
10. Renewal Theory
*11. Proof of the Basic Limit Theorem
12. Summary
13. Problems for Solution
14. Multiple Choice Questions
XIV Random Walk and Ruin Problems
1. General Orientation
2. The Classical Ruin Problem
3. Expected Duration of the Game
*4. Generating Functions for the Duration of the Game and for the First-Passage Times
*5. Explicit Expressions
*6. Connection with Diffusion Processes
*7. Random Walks in the Plane and Space
*8. The Generalized One-Dimensional Random Walk (Sequential Sampling)
9. Summary
10. Problems for Solution
11. Multiple Choice Questions
XV Markov Chains
1. Definitions
2. Illustrative Examples
3. Higher Transition Probabilities
4. Closures and Closed Sets
5. Classification of States
6. Irreducible Chains. Decompositions
7. Invariant Distributions
8. Transient States
*9. Periodic Chains
10. Application to Card Shuffling
*11. Invariant Measures. Ratio Limit Theorems
*12. Reversed Chains. Boundaries
13. The General Markov Process
14. Summary
15. Problems for Solution
16. Multiple Choice Questions
*XVI Algebraic Treatment of Finite Markov Chains
1. General Theory
2. Examples
3. Random Walk with Reflecting Barriers
4. Transient States; Absorption Probabilities
5. Application to Recurrence Times
6. Summary
7. Problems for Solution
8. Multiple Choice Questions
XVII The Simplest Time-Dependent Stochastic Processes
1. General Orientation. Markov Processes
2. The Poisson Process
3. The Pure Birth Process
4. Birth-and-Death Processes
5. The Birth-and-Death Process
6. Exponential Holding Times
7. Waiting Line and Servicing Problems
8. The Backward (Retrospective) Equations
9. General Processes
10. Summary
11. Problems for Solution
12. Multiple Choice Questions
Appendix: Examples with R Programming
Answers to Problems
Index

To purchase this product, please visit:
https://www.wileyindia.com/an-introduction-to-probability-theory-and-its-applications-vol-1-3ed-an-indian-adaptation.html

Scan to buy