

Kwantitatieve Methoden

Book Review Section

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DAVID STIRZAKER (9999).

Elementary Probability.

Cambridge University Press, Cambridge.

ISBN 0521534283, GBP 28.00.

This textbook provides a wholly comprehensive introduction to the general theory and application of elementary probability. The book has a very wide coverage of topics, including conditional probability, independence, discrete and continuous random variables, basics combinatorics, (moment) generating functions and limit theorems and an introduction to Markov chains. The textbook includes also an elementary approach to martingales and the theory of Brownian motion.

The ten chapters of the book are divided into an introduction and three main parts, each comprising three chapters. Each chapter covers a lot of theory on a variety of topics. The authors do provide a numerous amount of worked examples and exercises to illustrate the subject. Also a checklist of terms and a few recommendations for further reading are given.

Chapter 0 introduces the underlying concepts of probability in an informal way, such as chance, randomness, uncertainty, models, symmetry, pay-offs and a brief history of the subject. The first part introduces the basic ideas of probability, conditional probability and independence. In this way, chapter 1 is devoted to the concepts of probability such as notation, elementary rules, properties, axioms and rules of calculation. Chapter 2 reviews conditional probability, independence, recurrence and difference equations, whereas chapter 3 describes principles of counting like permutations, combinations, Pascal's triangle and generating functions.

The second part of the book, chapters 4 through 6, considers discrete random variables, probability mass functions and series. Chapter 4 focuses on the distribution functions and calculation and formulation of the expectation of random variables. Also the formulation of conditional distributions, the sequences of distributions and inequalities are addressed. Chapter 5 describes the properties of random vectors in two dimensions. Attention is paid to (in)dependence, expectation, sum and products of random variables, simple random walk and martingales. In chapter 6, the generating functions of chapter 3 are extended to moments and the Probability and Moment Generating Function.

The third part describes probability calculation with continuous random variables. Chapter 7 reviews general density and distribution functions of continuous random variables, functions of random variables, expectation, moment generating functions, conditional distributions, survival and hazard functions and geometrical probability. Chapter 8 focuses on the joint behaviour of collections of continuous random variables having joint density functions. The authors look at expectation, independence, the Poisson process and its crucial properties, together with continuous parameter martingales and the optional stopping theorem. Chapter 9 goes into detail on discrete and continuous Markov chains. The Markov property, first passage times, stationary distributions and forward equations are addressed. Also attention is paid to the Wiener Process, Brownian Bridge, the Ornstein-Uhlenbeck process and the Poisson process.

The book is suitable for education and to serve as a reference for both probability applications and problems. Also purposes of self-study are possible. The many purposes of the text as well as its high level of detail are indebted that the text is not easily readable. Nonetheless, the text is accessible to undergraduate students as the authors claim, but these undergraduate students deserve a solid background in at least calculus, linear algebra and set theory. After all, the book is a valuable contribution to the subject of probability.

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