Sankhyā : The Indian Journal of Statistics
2006, Volume 68, Part 2, pp 357-358

Book Reviews

Probability: A Graduate Course
Allan Gut
Springer Texts in Statistics
(2005) Springer, (xxiv)+603 pp.
Price $ 79.95 (set), ISBN 0-387-22833-0

The book under review is an excellent addition to the literature. It contains material that every graduate student ought to know, which is presented in a user friendly style.

Here are the contents in brief. The initial chapter starts with the measure theoretic foundation for probability spaces. Chapter 2 introduces random variables, their expectations and the concept of independence. The reader already gets to know record values, renewal theory and random walks, random sums of random variables as well as several Borel-Cantelli lemmas. Chapter 3 gives several useful probability inequalities including that of Marcinkiewicz and Zygmund. Chapter 4 presents the basic theory of characteristic functions. Probability generating functions, moment generating functions and the moment problem are also briefly discussed. Chapter 5 takes up various modes of convergence, their inter-relations concluding with the Skorokhod representation theorem. Chapters 6, 7 and 8 deal with the the three fundamental themes of probability theory, namely, the Laws of Large Numbers, the Central Limit Theorems and the Laws of Iterated Logarithm. Marcinkiewicz-Zygmund SLLN, Berry-Esseen estimates in CLT, subsequence LIL are all here. These three chapters, expectedly, end with 'additional results and remarks' sections which contain useful pointers (like Spitzer's convergence rates in SLLN, non-uniform estimates in CLT, LIL for number of records). Chapter 9 continues the discussion of limit theorems taking the reader to infinitely divisible laws, domains of attraction, max-stable distributions and the Stein-Chen method. The final chapter starts with conditional expectations followed by the basic theory of martingales with several applications.

The reviewer spotted only one typo: (p. 165) the factor 4π should be π.

Though one uses the inversion formula to calculate integrals, the reviewer has not seen the following terminology in the literature: two distributions on the real line are *married* if up to a constant factor, the density of one of them is the characteristic function of the other (p. 170). Perhaps a small paragraph on complex logarithm may be helpful while introducing (p. 184) cumulant generating functions. Theorem 11.4 (p. 249) should have been indexed under Slutsky as well. After mentioning the completeness of the real line, it is stated (p. 256) that the space of reals together with its σ-algebra of Borel sets is *complete*. Reference to usual metric rather than Borel sets would be more appropriate. There are more than 250 references, spanning from 1889 (Thiele, T.N.) to 2003, which the readers will find to be useful. There are enough examples and exercises. Motivations are amply provided throughout and are illuminating.

It is a pleasure to read the book and, in the opinion of the reviewer, every graduate student of probability would find it so.

B.V. Rao
Theoretical Statistics and Mathematics Unit
Indian Statistical Institute
203 Barrackpore Trunk Road
Kolkata 700 108, India
E-mail: bvrao@isical.ac.in