Nelson, Randolph

Probability, stochastic processes, and queueing theory. The mathematics of computer performance modeling. (English) Zbl 0839.60002

New York, NY: Springer-Verlag. xxvii, 583 p. (1995).

This book is an introduction to probability, stochastic processes, and queueing theory, and requires as background familiarity with elementary set theory, linear algebra, and calculus only. The author's goal is "to derive probability in a manner that highlights the complimentary nature of its formal, intuitive and applicative aspects". The application area that is chosen throughout the book is computer performance modelling.

The book is divided into 11 chapters entitled: 1. Introduction, 2. Randomness and probability, 3. Combinatorics, 4. Random variables and distributions, 5. Expectation and fundamental theorems, 6. The Poisson process and renewal theory, 7. The $M/G/1$ queue, 8. Markov processes, 9. Matrix geometric solutions, 10. Queueing networks, and 11. Epilogue and special topics. In addition there are appendices on types of randomness, combinatorial (in)equalities, Laplace transforms and generating functions, limits and order relationships, and summations.

Most characteristic of the book is the careful and lucid way in which concepts and results are introduced and developed. This aspect makes the book particularly well suited for self-study. Additional features are the many illustrative examples, exercises that have been classified as to their type and level of difficulty, and many footnotes with historical information. In summary, this is a well-organised, well-written text on the mathematics of computer performance modelling.

Reviewer: E.A.van Doorn (Enschede)

MSC:

60-01 Introductory exposition (textbooks, tutorial papers, etc.) pertaining to probability theory
60K30 Applications of queueing theory (congestion, allocation, storage, traffic, etc.)

Keywords:

matrix geometric solutions; Markov processes; Laplace transforms and generating functions; computer performance modelling