The first seven chapters use R for probability simulation and computation, including random number generation, numerical and Monte Carlo integration, and finding limiting distributions of Markov chains with both discrete and continuous states. Applications include coverage probabilities of binomial confidence intervals, estimation of disease prevalence from screening tests, parallel redundancy for improved reliability of systems, and various kinds of genetic modeling. These initial chapters can be used for a non-Bayesian course in the simulation of applied probability models and Markov chains. Chapters 8 through 10 give a brief introduction to Bayesian estimation and illustrate the use of Gibbs samplers to find posterior distributions and interval estimates, including some examples in which traditional methods do not give satisfactory results. WinBUGS software is introduced with a detailed explanation of its interface and examples of its use for Gibbs sampling for Bayesian estimation.

No previous experience using R is required. An appendix introduces R, and complete R code is included for almost all computational examples and problems (along with comments and explanations). Noteworthy features of the book are its intuitive approach, presenting ideas with examples from biostatistics, reliability, and other fields; its large number of figures; and its extraordinarily large number of problems (about a third of the pages), ranging from simple drill to presentation of additional topics. Hints and answers are provided for many of the problems. These features make the book ideal for students of statistics at the senior undergraduate and at the beginning graduate levels.

Eric A. Suess is Chair and Professor of Statistics and Biostatistics and **Bruce E. Trumbo** is Professor Emeritus of Statistics and Mathematics, both at California State University, East Bay. Professor Suess is experienced in applications of Bayesian methods and Gibbs sampling to epidemiology. Professor Trumbo is a fellow of the American Statistical Association and the Institute of Mathematical Statistics, and he is a recipient of the ASA Founders Award and the IMS Carver Medallion.

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