The final part, *Limit Theorems on Large Deviations* (by L. Saulis and V. Statulevičius), is devoted to using the cumulant method in limit theorems with large deviations. Applications to various types of statistics are presented.

The monograph is written at a research level and will be a useful reference for graduate students and researchers.

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**SAS System for Regression (3rd ed.).**
Rudolph J. Freund and Ramon C. Littell. New York: Wiley, 2000. ISBN 0-471-41664-9, viii + 236 pp. $34.95 (P).

In reviewing the second edition of this book (Berk, 1992), I said that it is an excellent guide to regression using the SAS system. The same is true of the third edition.

The changes correspond to changes in the SAS system. For example, Chapter 2 now includes high resolution graphics because some of the graphics output of the regression procedure are now optionally high resolution. It is interesting that some of the plots are still available as text only. Furthermore, the authors give a list of features of the old low resolution text plots that are not available in high resolution. In other words, the plots in PROC REG have been improved, but there is room for much additional improvement. Perhaps plots are not a high priority for the SAS package? Clearly, this is not true throughout the SAS Institute, because their JMP package emphasizes graphics.

Chapter 3, about regression assumptions, is mostly unchanged. However, again corresponding to an improvement in the software, the new edition shows how to get p values for the Durbin-Watson statistic using PROC AUTOREG. One wonders why the p value could not be incorporated into PROC REG, which does produce the Durbin-Watson statistic. After all, the p value is included with the Durbin-Watson in JMP.

I would quibble with the definition given on page 89 of the first-order autocorrelation, which is said to be the "actual sample correlation of adjacent residuals." The usual formula is followed by SAS (SAS Institute, 1990, p. 1434), and it is not quite the same as the correlation coefficient of adjacent residuals. Also, I would quibble with their definition of RSTUDENT, which in SAS is the studentized deleted residual. They say that it is the residual (they should say the deleted residual) standardized using a variance estimate based on the other observations.

SAS has a new feature, the Output Delivery System (ODS), which allows for creation of data sets from the output. The DFBETAS regression diagnostic is available in the output, but not as a traditional output data set. The authors show how to use ODS to obtain DFBETAS in a data set and use it in a graph.

In Chapter 4, Multicollinearity, there is a subsection on incomplete principal component regression. Previously, this had somewhat complicated example using the matrix program, PROC IML. Now there is a built-in feature to do this in PROC REG, therefore the example is much simpler. Previously, the section on ridge regression had just some discussion saying that it could be done with IML, but now there is an example showing the built-in ridge regression of PROC REG. This is complete with a ridge plot of the coefficients.

Chapter 5 has been changed from "Polynomial Models" to "Curve Fitting" to accommodate a new section on nonparametric curve fitting. This makes use of two new procedures. PROC EXPAND does moving averages and PROC LOESS fits curves with local polynomial models. ODS is used to gather the output of LOESS for four different smoothing parameters and to plot the results. Indeed, the four plots are all on one page, but the method for doing this is not given. A footnote says "the PROC GREPLAY statements are not shown."

Chapter 6, Special Applications of Linear Models, previously had three examples. There was an example of taking logs to linearize a multiplicative model, an example of spline fitting, and an example of the use of indicator variables. These sections are retained in the new edition, and the spline fit is still done with PROC REG using a RESTRICT statement to constrain the coefficients. The new TSPLINE procedure is mentioned (but only in the section on nonparametric fitting, as an alternative to LOESS and not used). A section on binary logistic regression has been added to Chapter 6.

Chapter 7, Nonlinear Models, is pretty much the same, except that some of the text plots have been upgraded to high resolution.

I am disappointed not to see anything about Box-Cox transformations. In particular, there is nothing about the ADTRANS macro, which determines the Box-Cox power transform by evaluation on a grid. The macro is part of the SAS/QC software.

There is nothing about partial correlation, even though the PARTIAL option for PROC REG is discussed. This option produces partial regression plots (added variable plots), and it would be only natural to discuss the correlation for the plotted points (the partial correlation).

Previously, there were seven chapters. Chapter 8, Using SAS/INSIGHT Software for Regression, has been added. This includes four examples showing how to use INSIGHT to do analyses done in the previous chapters. INSIGHT is an interactive program that operates as a menu-driven package within SAS. To my knowledge, it is the only way to do scatterplot matrices and rotating point clouds in SAS. However, it shares a deficiency with many interactive menu-driven packages. It provides essentially no command code to show what it has done. You can ask for such a code, but what you get is just a few global commands that are not nearly enough to reproduce the analysis. This is in contrast to the ANALYST program that is now available, but evidently too new to be mentioned in this book. It too is interactive and menu driven, but it will provide on request the detailed code for SAS input to get the same results.

The second edition had a data appendix showing the raw data for all the examples along with the code to read in the data. However, a case could be made that it was not needed because the data and commands were given in the main text. In any case, the appendix is gone from the third edition. I could not find in the book a web address for obtaining the data, but data for examples from the books in this series are available from (http://www.sas.com/services/library/onlinedoc/code.samples.html) and in particular the data from this book are available from (http://www.sas.com/samples/A57313). There are still no exercises. The addition of problems would make the book more useful as a text and as a self-study manual.

In the References, the list includes several books that now have newer editions. In one case the reference is to the first edition, but a fourth edition is now available.

Any book about software tends to be immediately obsolete, which gives a good reason for writing a new edition. The next edition should discuss the new ANALYST interactive system, the newly available confidence intervals for regression coefficients in PROC REG, the new TSPLINE procedure, and the new GAM procedure for fitting generalized additive models. On the other hand, PROC TRANSREG is several years old and operates somewhat like GAM, but it is discussed here in only a few lines.

Regardless of my few minor complaints, the new edition is an excellent introduction to regression and its implementation in SAS.

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**REFERENCES**

Berk, K. N. (1992), "Review of SAS System for Regression, Second Edition," *Journal of the American Statistical Association*, 87, 900–901.

SAS Institute, Inc. (1990), *SAS/STAT User’s Guide*, Ver. 6, 4th Ed., Vol. 2, Cary, North Carolina: SAS Institute, Inc.

**TELEGRAPHIC REVIEWS**

*Encyclopedia of Epidemiologic Methods.*
M. H. Gail and J. Benichou (Eds.). New York: Wiley, 2000. ISBN 0-471-866415. xxi + 978 pp. $235.00 (H).

This reference book contains an up-to-date broad coverage of the statistical aspects of most areas of epidemiologic methods and practice. Many of the articles have been extracted from John Wiley’s *Encyclopedia of Biostatistics* with some updating of its material. Other entries fill in remaining topics. The articles will be of interest to both practitioners and to more theoretically oriented statistical readers. The articles in this collection were written by experts in their respective areas, hence the quality of entries is
quite good. The editors have done an excellent job cross-referencing the topics.

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Spatial Statistics: Methodological Aspects and Applications.
Marc Moore (Ed.). New York: Springer-Verlag, 2001. ISBN 0-387-95240-3. xvii + 282 pp. $69.95 (P).

In recent years, the field of spatial statistics has seen important developments and has been applied in many fields of science. In 1997–98 the Centre de recherches mathématiques, Université de Montréal organized four workshops related to Spatial Statistics: Statistical Inference for Spatial Processes; Image Analysis; Applications of Spatial Statistics in Earth, Environmental and Health Sciences; Statistics of Brain Mapping. This volume contains thirteen articles based on some of the contributions to these four workshops. The articles can be divided into two main categories: inference for spatial process and image analysis. The collection should serve as a key reference to researchers in the field of Spatial Statistics.

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Studies in the Atmospheric Sciences.
L. Mark Berliner, Douglas Nychka, and Timothy Hoar (Eds.). New York: Springer-Verlag, 2000. ISBN 0-387-98757-6. x + 199 pp. $49.95 (P).

This short book overviews the recent statistical climate research conducted by The Geophysical Statistics Project at The National Center for Atmospheric Research. The leading authors of nine of the ten chapters in this book are current or former postdoctoral students of the Geophysical Statistics Project.

Roughly half of the chapters provide broad overviews of statistical methods used in climate research; the remaining chapters take on more of a case study form. Some of the chapters adopt a hierarchical Bayesian approach. As climatic data are frequently collected in both space and time, spatial and temporal analyses are prominent. Other topics and methods encountered include forecasting, principal components, wavelets, neural networks, classification, functional data analysis, general circulation models, and regression.

Overall, this compilation is well written and enjoyable to read. The book is homogeneous and authoritative; typographical errors are very sparse. This is a good book to own for any statistician interested in climate research.

Robert B. Lund  
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Data Analysis.
W. Gaul, O. Opitz, and M. Schader (Eds.). New York: Springer-Verlag, 2000. ISBN 3-540-67731-3. xii + 527 pp. $79.95 (P).

The field of “classification and data analysis” is becoming of increasing importance in the information age. This collection of articles is in honor of the Hans–Herman Bock, an important contributor to the field classification and data analysis. Many of the contributions tackle different aspects of data treatment and are grouped into three parts entitled: Classification, Data Analysis, and Applications. The contributors are mostly European with a sprinkling of Japanese and North American articles.

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Blind Estimation Using Higher-Order Statistics.
Asoke Kumar Nandi (Ed.). Norwell, MA: Kluwer Academic Publishers, 1999. ISBN 0-7923-8442-3. x + 284 pp. $120.00 (H).

Blind estimation methods are used in communications, signal processing, and related fields to estimate both the unknown input and the unknown transfer function of a system, based only on measurements of the output and certain assumptions. In the jargon of signal processing, higher-order statistics essentially refers to the use of cumulant information above and beyond second-order statistical information (SOS; e.g., auto- and cross-correlations). This expensive book illustrates the use of higher-order statistics in some important blind estimation problems. It is a compilation of five chapters, consisting of an introductory chapter on higher-order statistics, three important problems in blind estimation (signal equalization, system identification, and source separation), and a final chapter containing some proposals for “robust” cumulant estimation. According to the preface this book fills an important gap in the literature, with a goal of introducing the subject area, recording some of the major developments, and illustrating some challenges with the intent of spurring further research into this area. Its intended audience is graduate students and researchers in signal processing and related fields.

Robert L. Strawderman  
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Essays on Item Response Theory (Lecture Notes in Statistics).
Anne Boomsm, Marijette A. J. van Duijn, and Tom A. B. Snijders (Eds.). New York: Springer-Verlag, 2001. ISBN 0-387-95147-4. iii + 438 pp. $79.95 (P).

This collection of papers was compiled to celebrate the contributions made by the Dutch statistician and psychometrician Ivo Molenaar to the field of item response modeling upon his retirement last year. Of interest to readers of JASA are chapters on the life and research of Georg Rasch (Chaps. 1 and 2), two-parameter logistic models (Chap. 6), use of the EM algorithm for multidimensional models (Chap. 11), and an overview of nonparametric item response models (Chap. 14). Remaining chapters are rather specialized, and often, quite technical. The compendium is quite successful, however, at reviewing the state of the art in item response theory, and for suggesting many topics for future research.

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Probability: Elements of the Mathematical Theory.
C. R. Heathcote, Mineola: Dover Publications, Inc., 2000, xii + 267 pp. ISBN 0-486-41149-4 $8.95 (P).

This is a slightly corrected, unabridged republication of the book originally published under the same title by Wiley InterScience Division, John Wiley & Sons, Inc., New York in 1971. The book is divided into five chapters and contains all the standard topics taught in a good upper-division undergraduate course such as sample spaces, random variables, generating functions, joint distributions, Markov Chains, weak and strong convergences. It assumes knowledge of calculus and some real analysis. Written in an engaging style, it contains many worked examples and over 250 problems at the end of the chapters. This book is an excellent buy and highly recommended for advanced undergraduates and fresh graduate students.

Sreenivasa Rao Jammalamadaka  
University of California, Santa Barbara

Stochastics in Finite and Infinite Dimensions: In Honor of Gopinath Kallianpur.
Takeyuki Hida, et al. (Eds.). Boston: Birkhäuser, 2001. ISBN 0-8176-4137-8. xxxvi + 410 pp. $99.95 (H).

In 2000, Gopinath Kallianpur celebrated his seventy-fifth birthday. Friends and colleagues dedicate this Festschrift to his lifelong contribution to Stochastics. In addition to “A Glimpse into the Life and Work of Gopinath Kallianpur” (by B. V. Rao), the edited volume contains numerous articles from such diverse fields as filtering theory, quantum stochastics, interacting particles, Feynman integrals, stochastic analysis, SPDEs, mathematical finance, reflecting the diversity of Kallianpur’s contributions to Probability Theory and Stochastic Processes.

Paul Embrechts  
Swiss Federal Institute of Technology
Stochastic Differential Equations:
An Introduction With Applications (5th ed.).
Bernt Øksendal. New York: Springer-Verlag, 1998. ISBN 3-540-6320-6. xix + 326 pp. $34.95 (P).

The fifth edition of this well-established text has been supplemented by a new chapter on applications to mathematical finance. The new material discusses the ideas of arbitrage, complete markets, and option pricing with Black and Scholes formula. Other changes include the correction of some errors and misprints and the addition of some new exercises.

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