NEW BOOKS

The Basic George B. Dantzig. Edited by Richard W. Cottle, Stanford University Press, 2003, xvi + 378 pp., $49.95

This volume presents a selection of 24 of George Dantzig's papers, arranged in nine groups. Each group opens with a non-technical summary, introducing the specific area and discussing the current significance of Dantzig's work in that field. The headings of the groups are: 1. Mathematical statistics; 2. The simplex method of linear programming; 3. Large-scale linear programming; 4. Special applications and economic modeling; 5. Linear programming under uncertainty; 6. Network optimization; 7. Integer linear programming and linear inequalities; 8. Nonlinear programming; 9. Complementarity problems. There is also a list of George Dantzig's publications, containing 148 items.

Annual Review of Fluid Mechanics, Volume 35, 2003. Edited by John L. Lumley, Stephen H. Davis, and Parviz Moin, Annual Reviews, 2003, x + 565 pp.

In addition to eighteen papers on recent progress in fluid dynamics and related areas, this volume—as most others—includes a memoir on a distinguished practitioner of the field. This time, it is an article on Stanley Corrsin (1920–1986) by John Lumley and Stephen Davis, who survey Corrsin's professional life and his work on turbulence and turbulent transport, as well as his later interests in biofluid mechanics, involving topics such as cilial transport, corneal fluids, and placental-blood flow. The separate articles by Lumley and Davis are exceptionally perceptive, amusing—and moving—on both Corrsin and the Johns Hopkins Mechanics Department in its glory days. The articles are on subjects such as aircraft icing, turbulent wall flows, aerodynamics of small vehicles, complex fluids, stratified shear flow, atmospheric clouds, granular flows, jets, fluid interface methods, hydrodynamics in lakes, three-dimensional boundary layers, energy cascade in turbulence, and flow and dispersion in urban areas, as well as others.

Information Theory, Inference, and Learning Algorithms. By David J. C. MacKay, Cambridge University Press, 2004, xii + 628 pp., $50.00

This book covers not only Shannon's theoretical ideas and practical solutions to communication problems, but also brings in Bayesian data modelling, Monte Carlo methods, variational methods, clustering algorithms, and neural networks. The author unifies information theory and machine learning because he believes them to be "two sides of the same coin": state-of-the-art algorithms for both data compression and error-correcting codes use the same tools as machine learning, and brains are the ultimate compression and communication systems. After an introduction to information theory, as well as to

probability, entropy, and inference, there are six chapters: 1. Data compression; 2. Noisy-channel coding; 3. Further topics on information theory; 4. Probabilities and inference; 5. Neural networks; 6. Sparse graph codes.

Relativistic Numerical Hydrodynamics. By James R. Wilson and Grant J. Mathews, Cambridge University Press, 2003, xvi + 216 pp., $90.00

This is a volume in the Cambridge Monographs on Mathematical Physics series. It presents an overview of the computational framework in which calculations of relativistic hydrodynamics have been developed. It summarizes the terminology and methods used in the field and provides illustrative applications to real physical systems. The authors explain how to break down the complexities of Einstein's equations and fluid dynamics, stressing the viability of the Euler-Lagrange approach to astrophysical problems. The book contains techniques and algorithms enabling one to build computer simulations or relativistic fluid problems for various astrophysical systems in one, two, and three dimensions. It also shows the reader how to test relativistic hydrodynamics codes. Chapter headings: 1. Introduction; 2. Special relativistic hydrodynamics; 3. General relativistic hydrodynamics; 4. Cosmological hydrodynamics; 5. Stellar collapse and supernovae; 6. Axially symmetric relativistic hydrodynamics; 7. Hydrodynamics in three spatial dimensions.

Sampling, Wavelets, and Tomography. Edited by John J. Benedetto and Ahmed I. Zayed, Birkhäuser, 2003, xxi + 344 pp., $74.95

This collection of papers had its origin in the biennial Sampling Theory and Applications Conference, held in May 2001 in Orlando, Florida. It contains an introductory survey article, "A Prelude to Sampling, Wavelets, and Tomography" by Ahmed I. Zayed, and eleven contributions on subjects such as sampling without input constraints, irregular Weyl-Heisenberg frames, sampling in Sobolev algebras, nonbandlimited signals, polynomial matrix factorization, function spaces based on wavelet expansions, generalized frame multiresolution analysis of abstract Hilbert spaces, parallel-beam tomography, spiral cone beam computed tomography, meshfree flow simulation, and thin-plate spline interpolation.

Introductory Biostatistics. By Chap T. Le, Wiley-Interscience, 2003, xvi + 536 pp., $94.95

This introductory text is written for professionals and beginning graduate students in human health disciplines who need help to pass and benefit from the basic biostatistics requirement of a one-term course or a full-year sequence of two courses. Many real data sets in various fields are provided in the form of examples and exercises as aids to learning how to use statistical procedures. Chapter headings: 1. Descriptive methods for categorical data; 2. Descriptive methods for continuous data; 3. Probability and probability models; 4. Estimation of parameters; 5. Introduction to statistical tests of significance;

6. Comparison of population proportions; 7. Comparison of population means; 8. Correlation and regression; 9. Logistic regression; 10. Methods for count data; 11. Analysis of survival data and data from matched studies; 12. Study designs.

Constrained Statistical Inference - Inequality, Order, and Shape Restrictions. By Mervyn J. Silvapulle and Pranab K. Sen, Wiley-Interscience, 2004, xvii+532 pp., $89.95

This is a volume in the Wiley Series in Probability and Statistics. By Constrained Statistical Inference (CSI) the authors mean the analysis of statistical models under a complex network of constraints either in the space of unknown parameters or in the sample space of the observable random elements. They regard as the first monograph on CSI the 1972 book *Statistical Inference under Order Restrictions* by Barlow, Bartholomew, Bremner and Brunk. The scope of this monograph is indicated by the chapter headings: 1. Introduction; 2. Comparison of population means and isotonic regression; 3. Tests on multivariate normal mean; 4. Tests in general parametric models; 5. Likelihood and alternatives; 6. Analysis of categorical data; 7. Beyond parametrics; 8. Bayesian perspectives; 9. Miscellaneous topics. There is a bibliography of close to 1,000 entries.

Flowgraph Models for Multistate Time-to-Event Data. By Aparna V. Huzurbazar, Wiley-Interscience, 2005, xii+270 pp., $94.95

This is a volume in the Wiley Series in Probability and Statistics. Its focus is on stochastic models for censored time-to-event data with competing risks and recurrent events, with applications principally in survival analysis and reliability. The author views flowgraph models as a methodology for data analysis of semi-Markov processes that can be applied without the user becoming intimately familiar with the mathematical theory of stochastic processes. Chapter headings: 1. Multistate models and flowgraph models; 2. Flowgraph models; 3. Inversion of flowgraph moment generating functions; 4. Censored data histograms; 5. Bayesian prediction for flowgraph models; 6. Computational implementation of flowgraph models; 7. Semi-Markov processes; 8. Incomplete data; 9. Flowgraph models for queuing systems.

System Reliability Theory - Models, Statistical Methods, and Applications. By Marvin Rausand and Arnljot Hoyland, Wiley-Interscience, 2004, xviii+636 pp., $99.95

This is the second edition of a volume in the Wiley Series in Probability and Statistics, first published in 1993. It is a major upgrade. Two new chapters have been added (chapters 9 and 10) and most of the original chapters have been significantly revised, with the greatest number of new additions in chapters 3, 5 and 7. It has also a greater focus on practical applications than the first edition. There is a high number of new worked examples that are based on real industry problems and real data. Chapter headings: 1. Introduction; 2. Failure models; 3. Qualitative systems analysis; 4. Systems of independent components; 5. Component importance; 6. Dependent failures; 7. Counting processes; 8. Markov processes; 9. Reliability of maintained systems; 10. Reliability

of safety systems., 11. Life data analysis; 12. Accelerated life testing; 13. Bayesian reliability analysis. There are appendices with mathematical background items and a bibliography of about 300 entries.

Preparing for the Worst - Incorporating Downside Risk in Stock Market Investments. By Hrishikesh D. Vinod and Derrick P. Reagle, Wiley-Interscience, 2005, xv+286 pp., $79.95

This is a volume in the Wiley Series in Probability and Statistics. It provides a detailed accounting of the way in which downside risk can enter a portfolio and how it can be incorporated into current methods of stock valuation and portfolio management, thus identifying and preparing for the downside. The book introduces commonly used theories in order to show how the status quo often misses the downside and where to include it in the analysis. To include downside risk, the discussion is divided into three parts. Part I (chapters 1 - 3) covers the current theories of risk measurement and management. Part II (chapters 4-7) presents the violations of this theory and the need to include the downside. Part III (chapters 8 and 9) covers the quantitative and programming techniques to make risk measurement more precise. Chapter 10 concludes with a summarized treatment of downside risk. Chapter headings: 1. Quantitative measures of the stock market; 2. A short review of the theory of risk measurement; 3. Hedging to avoid market risk; 4. Monkey wrench in the works: when the theory fails; 5. Downside risk; 6. Portfolio valuation and utility theory; 7. Incorporating downside risk; 8. Mathematical techniques; 9. Computational issues; 10. What it all means. There is bibliography of about 250 items.