The author correctly states that the best way to learn and appreciate probability is to practice solving problems. In pursuit of this strategy, he has included over 350 problems and 200 examples. Most of the problems, especially in the early chapters, are thought provoking and fun, but many come from the world of gambling and parlor games. Those toward the end of the book are the more typical mathematical challenges found in elementary probability texts. Except for a small set of problems from finance, there are few meaningful real world scenarios.

My main concern with EPA is that I have difficulty identifying the target audience. Though the book is relatively error free, notation is sometimes cumbersome, and the mathematical requirements are uneven. Its strongest appeal should be to strong high school math students and undergraduate math majors who like the challenge of solving problems. I would also recommend EPA to those wishing to learn more about mathematical finance.

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Geostatistics Explained: An Introductory Guide for Earth Scientists.

Steve MCKILLUP and Melinda Darby DYAR. New York: Cambridge University Press, 2010, xvi + 396 pp., $90.00 (H), ISBN: 978-0-521-76322-6. $39.99 (P), ISBN: 978-0-521-74656-4.

The marketing information at the front of *Geostatistics Explained* (hereafter GE) describes it as follows: "This reader friendly introduction to geostatistics provides a lifeline for students and researchers across the earth and environmental sciences who until now have struggled with statistics. Using simple and clear explanations for both introductory and advanced material, it demystifies complex concepts and makes formulas and statistical tests easy to understand and apply." GE begins with a brief introductory chapter and then chapters on "Doing science: hypotheses, experiments, and disproof" (containing a bit of the philosophy of science), collecting and displaying data, experimental design, probability, and the relationship between data, populations, and statistics. These are followed by a chapter on one-sample and two-sample comparisons, one on errors in hypothesis testing and power, five chapters on various aspects of ANOVA, two brief chapters on correlation and regression, and three chapters on nonparametric methods. The final chapters survey some multivariate methods (principal components, multidimensional scaling, and clustering), sequence analysis (time series), spatial analysis, and choosing an appropriate test procedure.

The initial chapters are mildly informative and entertaining (e.g., an example involving dental caries for children from the two cities of Hale and Yarvard). There is some good advice regarding doing science ethically, avoiding plagiarism, resisting pressure from peers, etc. The authors make an effort to provide earth science examples and scenarios, though there are very few citations to published works.

Unfortunately the probabilistic and statistical heart of the book is marred by some serious misinterpretations and misstatements. Here is a sampling:

- p. 61: "The calculation of the probability of two events by multiplying the probability of the 1st by the probability of the 2nd is an example of Bayes' theorem."
- p. 76: "The known population value of μ is 100 and σ is 36. You take a sample of 16 individuals and obtain a sample mean of 81. What is the probability that this sample is from the population?" The authors then calculate $z = -2.11$, say it is outside the range of ± 1.96, "so the probability that the sample mean has come from a population with a mean of μ is less than 0.05."
- p. 78: "Statistics like the mean, variance, standard deviation, and **especially** the standard error of the mean are estimates of population statistics…"
- p. 82: "The Poisson distribution applies when you sample something by examining randomly chosen patches of a certain size, within which there is a very low probability of finding what you are looking for, so most of your data will be zero."
- p. 85: "In Chapter 7, we discussed how 95% of the means of a sample size n, taken from a population with known μ and σ, would be expected to occur **within** the range of $\mu \pm 1.96 \times \text{SEM}$. This range is called the **95% confidence interval**… "
- p. 202: "Statistical packages will calculate r and give the probability the sample has been taken from a population where $\rho = 0$."
- p. 216: "As F increases, the probability that the data have been taken from a population where the slope of the regression line, β, is zero will decrease and will eventually be less than 0.05."

In addition to these errors, I have some other reservations. No chapter contains more than three exercises, and most of these are rather artificial and simplistic. The exposition is indeed informal and intuitive, but this too often results in explanations which are so lacking in substance that readers will not know how to *use* statistical methodology. The calculation example in single-factor ANOVA spreads out over almost five pages, yet I am uncertain whether any reader could then carry out an F test on his/her own data. Examples are generally integrated into the exposition rather than prominently set out, making it difficult to know where they begin or end. There are no examples of output from actual statistical software packages, though the ability of such packages to do various analyses is frequently mentioned. And the last several specialized chapters try to cover too much material in too little detail (e.g., very brief mention of eigenvectors and eigenvalues, cluster analysis in 3.5 pages, cross-correlation in one page without an example).

It seems to me that earth science students deserve better than what GE serves up. By the time they study statistics, they should have some background in mathematics and physics, and an exposition that assumes a reasonable amount of quantitative sophistication should be in their comfort zone. Rather than use GE for an introductory course to earth science students, I would recommend that an instructor select one from among the many good elementary books written by statisticians and supplement with discipline-specific examples.

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A Guide to Monte Carlo Simulations in Statistical Physics (3rd ed.).

David P. LANDAU and Kurt BINDER. New York: Cambridge University Press, 2009, xv + 471 pp., $75.00 (H), ISBN: 978-0-521-76848-1.

Monte Carlo methods have become such a mainstay of statistical physics that it is impossible to imagine how the field could have developed without them. This book, which originally appeared a decade ago, is now in its third edition. Progress has marched on. Readers familiar with earlier editions will find plenty of new references sprinkled throughout, as well as an entire new chapter devoted to the burgeoning area of Monte Carlo methods in biology.

This edition, as with the previous ones, is best viewed as a handbook. The book provides relatively succinct overview material for each of a large number of topics, and then directs the reader to a well-chosen list of references for more specifics. I think it is of optimal value to experts in statistical and condensed matter physics, who may be familiar with a certain range of Monte Carlo techniques but need pointers to others. If you are planning to use this book for a course, note the authors' guidance in the preface: "The book is divided up in such a way that it will be useful for courses which only wish to deal with a restricted number of topics." This reflects the handbook approach, which can work well in the right kind of course. Heed the authors' advice. Take several sections and have students explore the relevant literature in those areas, perhaps using the exercises in the book as a springboard. These exercises are hardly self-contained or standalone, but again, that is the point: it will require students to turn to the literature, and this book provides the entry.

Not surprisingly, the sections with the most engaging reading are those where the authors' own research contributions have been instrumental. I very much enjoyed the treatment of self-avoiding walks in Chapter 3, as well as the two chapters on importance sampling methods (Chapters 4 and 5). If you can only read one section of the book, read Section 4.2. That is where finite-size effects are discussed, along with the tradeoffs that must be made between statistical and systematic errors given fixed computational resources. On the other hand, I am not so sure about the intended audience for the background chapter (Chapter 2): the notation is defined for standard symbols such as T and k_B (temperature and Boltzmann's constant), but I could not find any definitions for others, such as p, V, and N (pressure, volume, and number of particles). The section on protein folding in Chapter 14 contains a mysterious citation to unpublished data by Meinke et al., which does not appear in the list of references. Otherwise, the book seems well edited and refreshingly free of typos.

Readers looking for material that is less comprehensive but more pedagogical might want to look at the older book by Newman and Barkema (1999), which remains an excellent text for a course. Werner Krauth's (2006) more recent book on algorithms in statistical mechanics is also a delightful hands-on approach, and a large part of it, though not all, is devoted to Monte Carlo methods. Equipped with either of those, readers could take fullest advantage of Landau and Binder's volume.

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Krauth, W. (2006), *Statistical Mechanics: Algorithms and Computations*, Oxford: Oxford University Press. [138]

Newman, M. E. J., and Barkema, G. T. (1999), *Monte Carlo Methods in Statistical Physics*, New York: Oxford University Press. [137]

Just Enough SAS: A Quick-Start Guide to SAS for Engineers.

Robert A. RUTLEDGE. Cary, NC: SAS Institute Inc., 2009, xiv + 446 pp., $59.95 (P), ISBN: 978-1-59994-649-8.

This is a great book—an excellent resource for engineers. I wish I had a book like this when I started learning SAS 15 years ago—I would have been able to become productive in SAS much more quickly. With an emphasis on statistics, reliability, and quality, this book will be very useful to engineers and others working in research, product development, quality, statistical process control, and manufacturing organizations.

The book is organized logically. It starts with a discussion of how to import data into SAS from various sources, then how to summarize and analyze data, and finally how to create reports and charts in several formats. The book shows how to import data into SAS from spreadsheets and relational databases—probably the most common sources of data for engineers in corporate settings. SAS can read data from many other sources besides these, like text files, binary files, web pages, and FTP, but these are not mentioned, probably because of the "just enough" approach of the book. The book covers several procedures that analyze and summarize data, including MEANS, UNIVARIATE, ANOM, and FREQ. The book devotes a chapter each to analyzing quality data, like capability analysis and control charts, and reliability, including acceleration models and survival analysis. The book shows many techniques to create charts and reports to visualize your data. It demonstrates how to publish these reports in a variety of formats, including RTF (Rich Text Format, for interchange with Microsoft Word), PDF (to be read by the ubiquitous Adobe Acrobat reader), and HTML (to publish reports on a web server).

The topics covered in this book are up-to-date. A chapter is devoted to the new Statistical Graphics procedures in SAS 9.2, which provide powerful and elegant data visualization. The book also shows how to create Excel files with the ExcelXP tagset, which gives much greater control over the content and appearance of the file when it is opened in Excel than the older EXPORT procedure. People who have used SAS for 10 years may be not be aware of some of these new features in SAS.

The discussion is clear and to the point. The author explains a concept, provides an example SAS step to illustrate the concept, and then shows the expected output from the example. I was able to run the sample program after each example and see the result on my PC quite easily. The book comes with a companion website from which you can download the sample code and data used in the book. This makes it convenient to practice while you read the book.

Each chapter follows the same effective format. First, the most important topics are covered in detail. More advanced topics are introduced in a section called "More Than Enough." Finally, the "To Learn More" section at the end of each chapter provides references to other books and papers if the reader wants to learn more about topics covered in the chapter.

Probably the most popular introduction to SAS is the well-written and informative *The Little SAS Book* by Delwiche and Slaughter (2008). This is a good choice for many people. But the topics covered in *Just Enough SAS*, the depth of coverage, and use of scientific data in the examples make this book a better choice for engineers.

Just Enough SAS achieves its stated purpose: to provide "just enough" instruction on a broad variety of topics so that a new SAS user can become productive very quickly. This ability to help an engineer quickly use SAS effectively makes the book well worth its price.

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REFERENCE

Delwiche, L., and Slaughter, S. (2008), *The Little SAS Book: A Primer* (4th ed.), Cary, NC: SAS Institute Inc. [138]

A Practical Guide to Scientific Data Analysis.

David N. LIVINGSTONE. Hoboken, NJ: Wiley, 2009, xv + 341 pp., $85.00 (H), ISBN: 978-0-470-85153-1.

The rate at which scientific data is accumulating creates a tension between the volume of data to be analyzed and the number of those who have the proper background to perform the analysis. To release this tension, dissemination of statistical knowledge in a wider population of researchers is required. In the first chapter of Livingstone's book devoted to "data and its properties," the author describes the book's target audience as "scientists who want to analyze their data properly but who don't have the time or inclination to complete a degree course in statistics." The focus on this audience is maintained throughout the book, with a gentle and well-thought-out balance between formal description of analytical methods and their extended textual and visual explanations. From a statistician's point of view, this balance may seem shifted to presenting the material using human language and visualizations; the book is definitely not overwhelmed with equations. On the contrary, the simple but most important equations are sometimes duplicated in different contexts (such as Euclidian distance in Chapters 4.3 and 5.2). Nevertheless, considering the background of a prospective reader, this presentation achieves its aim perfectly. The majority of the real-world examples used in the book for illustration purposes come from chemistry. At the same time, the highly detailed, thoughtful and readable explanation of statistical and data-mining concepts throughout the book will make it a valuable addition to the libraries of a wide range of researchers. Overall, the book is written to target an extremely important niche and will well serve those scientists looking to elevate their statistical knowledge in relevant areas. It is definitely worth its purchase price and may be considered seriously as a textbook for nonmajor statistics students and research scientists in a wide variety of fields.

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A SAS/IML Companion for Linear Models.

Jamis J. PERRETT. New York: Springer, 2010, xiv + 228 pp., $59.95 (P), ISBN: 978-1-4419-5556-2.

In the preface, the author states the objective of this book: "This companion does not teach linear models concepts, but demonstrates how SAS/IML can be used to evaluate numerical linear model probability." In particular, this book focuses on computing linear model results using the interactive matrix language (IML) in SAS, which is quite different from a number of other texts that present either the theory or the application of linear models. The book is only for readers who wish to pursue techniques for linear models computations with SAS/IML. From this perspective, the focus is quite explicit and concentrated. As a unique aim of the book, computation using IML links the theory and the application of linear models, and therefore functions as a bridge between these domains.

The book provides the SAS/IML code for implementing linear model computations based on matrix operations. Chapters 1–3 present the IML structure and its features, and discuss the creation of a matrix, the input and output of data, and data operations. Chapters 4–6 cover the manipulation of matrices that are related to linear models. Chapters 7–10 apply the techniques developed in the first six chapters to the multivariate normal distribution, the general linear model, and the linear mixed model. These chapters also cover a few statistical computational methods, such as the square root and the sweep methods.