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Book Review

Harry Lass and Peter Gottlieb, *Probability and Statistics*, Addison-Wesley, Reading, Massachusetts, 1971. 470 pp. $12.95.

This is an excellent, interesting new text for seniors or beginning graduate students. It is written for those with a good first course in calculus. Advanced calculus does not appear to be needed for the most part; a smattering of matrix theory would be helpful in spots.

The book has a number of features that make it stand out from the large crop of probability and statistics books currently appearing. It has a strong emphasis on applications to physical problems, many arising in the field of communications theory; a large number of interesting, worked-out examples; a good set of problems of varying degrees of difficulty (with answers provided for some); a number of derivations done from two entirely different points of view, thereby showing different aspects of the same problem; and a clear discussion and description of many stochastic models. The level of exposition is uniformly high. Combinatorial theory is given considerable emphasis.

Chapter headings and highlights of the chapters are given below.

Chapter 1, Set Theory and Boolean Algebra. Standard material on set operations.

Chapter 2, Combinatorial Analysis. Excellent material going far beyond what is normally found in a general probability and statistics text.

Chapter 3, Discrete Probability Theory. Discussion of various approaches to probability. Usual material on discrete distributions, their moments, etc. A very good section on generating functions, and a section on recurrent events.

Chapter 4, Continuous Probability Theory. Standard material on continuous distributions; distribution of a function of a random variable; characteristic functions; joint, conditional, and marginal distribution functions; correlation, covariance, and regression; geometrical probability.

The multivariate normal distribution is discussed using matrix notation and methods.

Chapter 5, Properties of Statistical Samples. Properties of sample means and variances, Chebyshev's inequality, laws of large numbers, distribution of the sample mean and the sample variance in samples from a normal distribution.

Chapter 6, Parametric Point Estimation. Maximum *a posteriori*, maximum likelihood, and Bayes estimation; simple and multidimensional regression.

Chapter 7, Parametric Interval Estimation. Standard univariate confidence intervals; confidence ellipsoids for regression parameters; ellipsoidal probability regions for the multivariate normal distribution.

Chapter 8, Order Statistics and Nonparametric Methods. Distribution of individual, and several, order statistics; asymptotic distributions of order statistics; tolerance intervals; confidence intervals for quantiles.

Chapter 9, Hypothesis Testing. Type I and II error; power; discussion of a few parametric and nonparametric tests. Rather limited coverage of this topic.

An appendix gives concise discussions concerning difference equations, determinants, systems of homogeneous linear equations, matrices, quadratic forms, coordinate transformations and Jacobians, along other topics. There are tables of the normal, chi-square, student's $-t$, and F distributions.

There are very few misprints. In Fig. 3.6 p. 77, the upper line of the cumulative distribution function is improperly placed. This is unfortunate because it is the first appearance in the book of the c.d.f. of a discrete random variable. Also in that figure there appear designations like "$F \equiv 3/4$" in place of the correct "$F(x) = 3/4$." On p. 182, mention is made of "the Student I random variable".

There is some nonstandard notation employed: ν_r, instead of the usual μ_r', for an rth moment about the origin; $E(y)$ for the integral from $-\infty$ to y of the standard normal distribution. The latter might possibly get confused with the expectation operator. [The $E(y)$ notation appears in the text; F is used in place of E in the appended table of the normal distribution.]

I unhesitatingly recommend the text for classroom use. An instructor might want to supplement the material on hypothesis testing with outside readings. Those using the book for self-study will need to watch out for a number of important definitions "buried" in among regular text material. I think it would have been preferable to set these off and clearly label them as definitions. Similarly, there are a number of excercises, not clearly identified as such, appearing in the body of the text.

But these few faults I find with the book are minor and easily overcome.

I enjoyed reading the book and believe it would be an interesting and challenging text from which to teach. Lass and Gottlieb are to be congratulated for a job well done.

Ernest M. Scheuer
San Fernando Valley State College
Northridge, California