

Books

Experimental Designs. By W. G. Cochran and G. M. Cox. 453 pp. John Wiley and Sons, Inc., New York, 1950. \$6.50.

Statistical Design and Analysis of Experiments for Development Research. By Donald Statler Villars. 455 pp. Wm. C. Brown Co., Dubuque, Iowa, 1951. \$6.50.

During the past twenty years there has been a great extension in the use of statistics to analyze experimental results. It has been shown that statistics is useful not only in analyzing a large mass of data but also in analyzing what may seem to be an inadequate amount of data. In fact, statistical theory has become so powerful that it has proved useful to design experiments so that the maximum amount of information can be obtained from them by statistical means. These two books provide a guide to the experimenter by which he can so design his experiments.

The need for such books can be understood when it is realized that in experiments where little is known about the type of variability that may be present, unexpected biases can occur from some innocuous rule about the order in which the experiment is conducted. For example, to test which of two calculating machines is the faster, similar computations may be done on each machine in turn. Now, if one machine is always used first, this may introduce a bias in favor of the second machine since, because of the repetition, the operator may be more familiar with the computation the second time. Of course, this source of bias may be eliminated by using each machine first half the time. This is a very simple illustration of experimental design.

The book by Cochran and Cox is essentially a handbook listing the possible types of design, such as randomized blocks, Latin squares, split plots, etc. Each design is illustrated by an example of its use in agricultural experiments; the proper use of statistics in treating the data obtained is explained; and, finally, the advantages and disadvantages of the proposed design are discussed. This book should prove very useful to an experimenter. It must be remarked, however, that it assumes the knowledge of a good introductory course in statistics including analysis of variance and that it is fairly difficult reading.

On the other hand the book by Villars demands a minimum of statistical knowledge. It is the outgrowth of a course of lectures given at the University of Delaware, the General Foods Corporation, and the United States Naval Ordnance Test Station. The author, writ-

ing from the standpoint of a research chemist, first points out the necessity of the use of statistics in industrial experiments because the experimental results obtained are so highly variable. The variability results from the poor reproducibility in setting up experiments as well as from the error in measurement. Next, the author shows how statistics can be used to analyze the experiments; finally, he discusses how the experiments should be set up so that the experimental errors may be minimized.

Besides the theory of experimental designs, the author also discusses the use of control charts and of sequential analysis. This book may be recommended as an introduction to the use of statistics in industry.

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Conformal Mapping. By L. Bieberbach (translated by F. Steinhardt). 234 pp. Chelsea Publishing Company, New York, 1953. \$2.25.

This is a translation of one of Professor Bieberbach's well-known texts and shares the virtues and drawbacks of his more famous *Funktionentheorie*. This book is compact, a bit difficult for the complete novice at complex variables, not complete enough for the advanced student, but quite useful for reference or restudy by one who has once had a course in complex variables but who uses it only occasionally. The first chapter contains a general survey of the subject and a discussion of the transforms represented by linear functions; the second chapter is devoted to those for rational functions; the third chapter returns to general theory. The fourth chapter has a discussion of the transforms represented by $(z + z^{-1})$, by the exponential, by trigonometric functions, and by the elliptic functions. The fifth chapter, making up more than half of the book, is an introduction to the problem of mapping of various regions onto the interior of a circle or onto the upper half of the complex plane (Schwartz-Christoffel formula). A number of the simpler examples are worked out. There is a short but adequate index.

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Classical Mechanics. By H. C. Corben and Philip Stehle. 388 pp. John Wiley & Sons, Inc., New York, 1950. \$6.50.

According to its authors, *Classical Mechanics* "is intended to be a modern book on an old subject". As a result this book is not just an exposition of classical mechanics as an end in itself but rather a discussion of the material with the intention of introducing to the reader concepts and mathematical techniques which, while useful and in some cases basic in classical mechanics, nevertheless find their greatest application in quantum theory. This awareness of the imminent exposure of the student of classical mechanics to