for a concise and very readable text that offers him the true physicist's insight in place of the mathematician's epsilons and deltas.

MICHAEL GOLOMB

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***Acoustic Measurements.*** Leo. L. Beranek. New York: John Wiley; London: Chapman & Hall, 1949. 914 pp. $7.00.

In *Acoustic Measurements* Dr. Beranek gives us a handbook covering the basic procedures followed, and the instrumentation required, for the measurement of sound. Theory and practice are blended to make a volume that is at once a compendium of detailed information and a summarizing textbook. It should prove useful to anyone concerned with acoustics.

The twenty chapters cover an extraordinary variety of topics, ranging from the anatomy of the ear to a description of the testing rooms of the National Physical Laboratories in England, and from the mathematical basis of a reciprocity calibration to a list of words used in articulation testing. In each case, ample illustrative material complements a clearly written text.

Considered individually, most of the chapters present information of interest to those who require a "how-to-do-it" book. For example, descriptions of common microphones, with diagrams, show the essential details of their construction, the text and figures illustrating their weak and strong points as tools. Sound sources and sound analyzers are similarly handled. Knowledge of the facts presented should enable the reader to make an intelligent choice of the device that will best serve his needs. A further point: the author's care to define the limitations of his instruments and procedures alerts the reader continuously to the pitfalls inherent in such measurements.

Considered together, the chapters make a comprehensive textbook, complete with subject and author index and a glossary of terms. The bibliography is distributed as footnotes, and some 85 percent of the references are to publications in English. Although certain of the topics seem less adequately treated than others, the effort to cover the entire field has, on the whole, been successful.

ROBERT GALAMBOS

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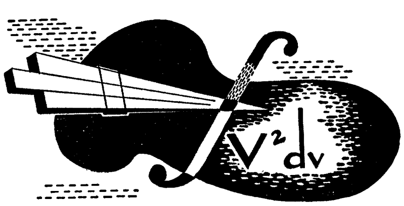


***Algebraic Curves.*** Robert J. Walker. Princeton, N. J.: Princeton Univ. Press, 1950. 201 pp. $4.00.

Plane geometry in antiquity concerned itself for the most part with the straight line and the conics, studied by synthetic means. It was only with the introduction of analytic methods in the 17th century that it became possible to consider algebraic curves in general. Since that time a large number of particular curves have been exhaustively studied, and an extensive and beautiful theory of algebraic curves has been developed. It is with this theory that the present book is concerned.

Although the subject matter is classical, the author has made use in his exposition of some of the concepts of modern algebra, such as fields, ideals, and valuations. At the same time, he has set himself the task of keeping the treatment on as elementary a level as possible. In this objective he has admirably succeeded. Very little previous knowledge of algebra on the part of the reader is required, since the first chapter is entirely devoted to algebraic preliminaries, and further algebraic concepts are introduced throughout the book as needed. The second chapter develops the necessary material on projective spaces.

The subject matter of the book proper begins with Chapter III. Here are discussed plane algebraic curves, their singularities, and the reduction to ordinary singularities by quadratic transformations. By means of resultants, Bezout's theorem is proved in a weak form: The number of intersections of two curves is at most the product of their degrees. The full theorem of Bezout is proved in Chapter IV, after the introduction of formal power series and the definition of a place of a curve. These notions are then used to prove Noether's theorem also. Chapter V deals with space curves and with rational and birational transformations of algebraic curves. Finally, Chapter VI contains the theory of linear series and the Riemann-Roch theorem.

There are a large number of excellent exercises, ranging from the very elementary to the quite difficult. It is pleasing to note that the author has not contented himself with merely developing the general theory but has applied it, both in text and exercises, to various special curves. Many drawings are given, and these will be found very helpful.

This book should make available to a wide class of readers the classical theory of algebraic curves.

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***The Theory of Probability: An Inquiry into the Logical and Mathematical Foundations of the Calculus of Probability,*** 2nd ed. Hans Reichenbach. Translated by Ernest H. Hutten and Maria Reichenbach. Berkeley and Los Angeles: Univ. of California Press, 1949. 492 pp. $12.50.

This book is the English version of the author's "*Wahrscheinlichkeitslehre*" of 1935. Several changes—which, however, do not bear upon the essential contents—are listed in the preface. Reichenbach's theory is an attempt to combine and to reconcile two different concepts of probability: the mathematical notion of numerical probabilities which underlies the so-called calculus of probability, and the entity of phenomena to which the terms *probable* and *improbable* of everyday language usually apply. The main characteristics of his conception are that he accepts the frequency interpretation in the calculus of probability without introducing a randomness concept and that he claims for the probability theory an over-all importance as being "the nucleus of every theory of knowledge" (p. v).

The first chapters of the book are an introduction to the more or less elementary problems and methods of probability computation. Much use is made hereby of the modern notations of symbolic logic. What the reader finds here can be found in a more conventional form of notation in most mathematical texts. In fact, it is not difficult to prove that, if one writes down all natural numbers starting with 1, 2, 3, . . . and continuing up to the highest 100 digit number, only 20 percent of these numbers will include more than 12 fives. But it is a long way from this arithmetical fact to the statement that in putting down one set of 100 digits at random one has an 80 percent probability of getting less than 13 fives. This gap cannot be bridged by any display of formulas of symbolic logic. It would require a clear-cut definition of what is meant by random, but the author has not given such a definition. The examples he uses to illustrate the theory are of a different type. He goes to great lengths, for instance (pp. 254–257), in dealing with the case of a Dr. B., who was suspected of murdering his wife in order to collect insurance benefits. The starting point is a statement of the insurance company that four out of five husbands who take out large amounts of life insurance for their wives do so with criminal intentions. After a lengthy calculation which takes into account several instances of possible murder the result reads: "The probability of murder, on the basis of the known facts, is therefore 84%. What makes this value even higher than the antecedent probability of 80% is the fact that the insured person died, and not of a natural death" (p. 257). Computations of this type are often used to discredit the calculus of probability in the public eye.

The eighth chapter introduces a new idea under the heading "Theory of Probabilities of a Higher Level." Its main purpose is to justify the "inductive inference," i.e., the rule that the frequency observed for a finite initial section of a sequence can be identified with the probability controlling the sequence (p. 329). It is not quite clear to the reviewer why the inverse probability, discussed in the preceding sections, should not belong to the probabilities of second level (i.e., probabilities of a probability value).

The last three chapters—9, 10, and 11—are entitled "The Problem of Application," "Probability Logic," and "Induction." In this field lies what the author apparently considers to be the main original achievement of his theory. The multivalued logic is another form of presenting the most elementary probability relations. "Quantitative truth" and "quantitative negation" can, in the last instance, be interpreted only in terms of frequencies. Reichenbach thinks that he needs this new formalism for his theory of induction. Here he discusses such questions as why Newton's law of gravitation has been accepted as a general law when it was checked only by a finite number of tests; why it was discarded in favor of Einstein's theory on the ground that it disagreed with observations in one single instance. He rejects the idea that the unification of theories serves intellectual needs —it simply increases their probability (p. 433). All kinds of scientific statements, each single argument and each comprehensive theory, has a certain assignable probability value, and "all the questions concerning induction in advanced knowledge, or *advanced induction,* are answered in the calculus of probability" (p. 432). These quotations and the following one must be given here without comment. The reader might wish to know what Reichenbach calls the rule of induction and presents in prominent print on page 446:

*"RULE OF INDUCTION. If an initial section of* n *elements of a sequence* $x_i$ *is given, resulting in the frequency* $f_n$, *and if, furthermore nothing is known about the probability of the second level for the occurrence of a certain limit* p, *we posit that the frequency* $f_i$ $(i > n)$ *will approach a limit* p *within* $f_n \pm \delta$ *when the sequence is continued."*

No indication is given in the book about the magnitude of $\delta$.

R. v. Mises

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***Introduction to the Theory of Probability and Statistics.*** Niels Arley and K. Rander Buch. New York: John Wiley; London: Chapman & Hall, 1950. 236 pp. $4.00.

The first sentence of the preface states that "the purpose of the present book is to give an elementary introduction to the theory of probability and statistics with special regard to its practical applications." Although the book has some excellent features, it is the reviewer's opinion that the authors have been only moderately successful in the objective stated.

In the first place, the treatment is far from elementary, and the style of exposition is condensed. It is doubtful whether it could be read with profit by many students below the postgraduate level, or by anyone who has not reached a considerable degree of maturity in mathematics. (It may be mentioned, however, that this is a translation of a Danish text, and perhaps the average freshman in a Danish university is much better prepared in mathematics than his American counterpart.)

Secondly, the emphasis seems to be very much on the theoretical, rather than the practical, aspects of the subject, and the practical illustrations included are taken from the so-called "exact" sciences—physics, astronomy, engineering, etc. This book would be an excellent introduction to the subject for a physicist (it is the author's impression that it is just the sort of book many physicists ought to read) or a mature mathematician without any previous knowledge of this field. It is difficult to see what other purpose it could serve, as it is too difficult for an elementary text, and not sufficiently comprehensive to be used as a reference book by one who has occasion to apply statistics and probability in his work.

The first seven chapters deal exhaustively with the theory of probability distributions, and the illustrations include a number of such distributions arising in physics, which are probably not familiar to most statisticians. Chapter 8 deals with probability limit theorems and Chapter 9 contains a brief but very able discussion of the relation of the theory of probability to experience