

SHORTER NOTICES

The Application of Statistical Methods to Industrial Standardization and Quality Control. By E. S. Pearson. London, British Standards Institution, Publication Department, 1935. 161 pp.

The main object of this publication is to set out as clearly as possible why statistical technique is needed and what particular statistical methods are of practical assistance in the solution of certain problems in the industrial standardization or quality control of manufactured articles or of other articles offered on a market. In the fields of standardization and quality control of manufactured products by statistical methods, W. A. Shewhart of the Bell Laboratories was first to show the practical value of these methods. Improvements in the original technique advocated by Shewhart are presented in the book under review. The essential problem is one of testing a batch or consignment including so many items that the practical procedure is to test by sample. In other words, the problem is one in which statistical theory is to be used in estimating the quality of the whole by testing an appropriate but relatively small part of the whole. The concepts of random sampling, representative sampling, statistical uniformity, and level of control are developed and certain principles are formulated in this connection.

Specifications are necessary to characterize the items considered and to indicate the degree of conformity to a standard. An essential part of the specifications is a definition of the method by which conformity is to be secured. Two principal methods are described: (1) that of testing units sampled from consignments, (2) that of requiring records to be kept by the producer which, supplemented by a system of check testing, provides statistical evidence of the level of control maintained during manufacture. The publication deals with the simpler methods of statistical analysis that may be applied during the process of manufacture to assess the level of the control of quality.

It is shown how the results may be usefully presented in the form of simple control charts. Illustrative examples are given throughout the publication to introduce the general problems of inquiry by sample. Then sampling methods in theory and practice are briefly but carefully discussed. Next a procedure is outlined by which the variation of mean and standard deviation in samples are used to estimate the variation of mean and standard deviation of the population. The reliability of a mean estimated from representative samples and from duplicate samples is considered. To obtain, for assigned odds, the upper and lower bounds of the intervals within which the population mean, standard deviation, and coefficient of variability will lie, on the basis of estimates from a sample, it seems desirable in some cases to obtain the fiducial or confidence limits instead of depending on the older "probable error" theory involving the assumption that the number of items in the sample is large. The dependability of the confidence limits depends on the validity of the assumptions:

- (1) that the variation is statistically uniform;

- (2) that the form of variation among the units is approximately normal;
 (3) that the sample is drawn from a supply with at least twenty times as many units as are in the sample.

The basis of control charts is briefly described, with special reference to the methods of estimating the standard deviation of the population. It seems to the reviewer that this publication adapts recent progress in sampling theory admirably to a wide range of applied problems in quality control.

H. L. RIETZ

Einführung in die Liniengeometrie und Kinematik. By Ernst August Weiss. Berlin and Leipzig, Teubner, 1935. vi+122 pp.

This is volume 41 of Teubner's *Mathematische Leitfäden* and is written by Professor Weiss of the University of Bonn, a pupil of E. Study, the notable geometrician who made the same university a well known center of mathematical activity. The contents of the little text, as Weiss states, are closely connected with the name of Study and it is one of the author's aims to introduce the reader to Study's methods.

After discussion of the linear complex in R_3 , line space is mapped upon R_5 as first conceived by Klein. Then follows an investigation of manifolds of complexes and the loci of points and planes connected with them; next an account of Lie's line-sphere transformation and applications in kinematics. The principal theorems of movements and reflexions are derived by the elegant calculus of biquaternions. An important feature of the book is the use of complex spaces and hyperspaces.

The whole treatment is very interesting and affords the reader an insight into a number of novel ideas, which may act as stimulants for workers in this field. The reviewer, however, is under the impression that for the purpose in view and the results obtained, the analytical machinery is in places unnecessarily artificial.

ARNOLD EMCH

Arithmétique et Géométrie sur les Variétés Algébriques. By André Weil. 16 pp.
Quelques Propriétés des Variétés Algébriques se Rattachant aux Théories de l'Algèbre Moderne. By Paul Dubreil. *Actualités Scientifiques et Industrielles*, Nos. 206, 210. *Exposés mathématiques publiés à la mémoire de Jacques Herbrand*, Nos. XI, XII. Paris, Hermann, 1935. 33 pp.

These two booklets belong to a series of memoirs published by friends to commemorate Jacques Herbrand, the young French mathematician whose premature death was a severe loss for modern French mathematics. The present pamphlets both deal with the general polynomial ideal theory of E. Noether and van der Waerden, and its applications to algebraic problems. Weil continues investigations by Siegel and himself on the general theory of diophantine equations and shows how certain algebraic decomposition theorems correspond to number theoretical decompositions. Dubreil first studies some properties of the decomposition of homogeneous ideals into primary components and these results are then used to derive general theorems on algebraic varieties.

OYSTEIN ORE