13[K].—Masaaki Sibuya, "Modal intervals for chi-square distributions," *Ann. Inst. Statist. Math.*, v. 9, 1958, p. 225–236.

Let $f(x)$, $-\infty < x < \infty$, be a continuous unimodal probability density function, and let L, $U(L < U)$ satisfy the conditions: $\int_L^U f(x)\,dx = 1 - \alpha$ and $f(U) = f(L)$. Then $| L, U |$ is called the $(1 - \alpha)$-content modal interval for $f(x)$. In this paper $f(x)$ is taken to be the χ^2 density function with ϕ degrees of freedom. Applications are discussed, and a method of computation of modal intervals with given content is developed for this case. Tables are presented of L to 4D, U to 3D, $P_r(x^2 \leqq L)$ to 5D, and $(U - L)/(U + L)$ to 4D, for $\phi = 3(1)30(10)100$ and $1 - \alpha = .8, .9, .95, .99$. A previous table [1] gave values of $1 - \alpha$, effectively for $(U - L)/U + L) = .01, .05, .10, .20$, and $\phi = 4(4)80$.

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1. M. A. Girschick, H. Rubin & R. Sitgreaves, "Estimates of bounded relative error in particle counting," *Ann. Math. Statist.*, v. 26, 1955, p. 276–285.

14[K].—Masaaki Sibuya & Hideo Toda, "Tables of the probability density function of range in normal samples," *Ann. Inst. Statist. Math.*, v. 8, 1957, p. 155–165.

This paper gives details of the calculation of the probability density function $f_n(w)$, for which there are included tables to 4D corresponding to $w = 0(.05)7.65$ and $n = 3(1)20$, where n represents the size of the normal sample. Cadwell's formula [1] is cited as the basis for this calculation.

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1. J. H. Cadwell, "The distribution of quasi-ranges in samples from a normal population," *Ann. Math. Statist.*, v. 24, 1953, p. 603–613.

15[K, S, V].—O. G. Sutton, *Mathematics in Action*, Harper & Bros., New York, 1960, xvi + 236 p., 20 cm. Price $1.45 (Paperback).

In the words of its author, "This book, written primarily for the layman, will prove . . . of interest also to students, especially those in the upper forms of schools or in the first years in the university. It is a view of the part played by mathematics in applied science, as seen by a mathematical physicist."

Chapter 1, "The Mathematician and his Task," begins by discussing the meaning of theories in physics and the role of mathematics in the development of these theories. Chapter 2, "The Tools of the Trade," gives special attention to complex numbers and to the development of the calculus and the differential equations of mathematical physics. The approach is essentially that of the physicist ("an infinitesimal quantity [is] one which does not exceed the smallest change of which we can take cognizance in our calculations").

The remaining five chapters, entitled respectively, "Ballistics or Newtonian Dynamics in War," "An Essay on Waves," "The Mathematics of Flight," "Statistics or the Weighing of Evidence," and "Mathematics and the Weather," are essentially independent essays that not only provide illustrations of applied mathematics in action, but also serve to emphasize fundamentals in both classical and modern physics. An especially notable example is the approach to Heisenberg's uncertainty principle through the problem of the bandwidth required to resolve pulses of short duration. Perhaps the most stimulating chapter is the last, in which the author concludes that "Certain apparently sensible questions, such as the question of weather conditions . . . several days ahead, are in principle unanswerable and the most we can hope to do is to determine the relative probabilities of different outcomes."

There may be some question as to whether the non-mathematical layman will be able to follow all of the development of the last five chapters, and the author is occasionally guilty of extravagance. (Few aerodynamicists, even in the United Kingdom, would be willing to admit that F. W. Lanchester's esoteric volumes *Aerodynamics* and *Aerodonetics* "played a part in aerodynamics not unlike that exercised by Newton's *Principia* in astronomy.") These things notwithstanding, the reviewer believes that the author has succeeded admirably in reaching the goal described in the opening quotation of this review. Indeed, he goes beyond this goal, and the book (especially the individual essays) is warmly recommended to practicing applied mathematicians, as well as to laymen and students.

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16[K, S, W].—C. West Churchman & Philburn Ratoosh, Editors, *Measurement: Definitions and Theories*, John Wiley & Sons, Inc., New York, 1959, vii + 274 p., 24 cm. Price $7.95.

The December 1958 meetings of the American Association for the Advancement of Science included a two-day symposium on Measurement. The dozen papers of this symposium are included in this volume, together with a related paper separately invited but not delivered.

The book is divided into four parts. Part I, "Some Meanings of Measurement," consists of four papers concerned primarily with defining and characterizing the concept of measurement. Part II, "Some Theories of Measurement," contains three papers that approach the definition and characterization of measurement in more formal language—mathematical and logical symbols are more in evidence here—and thus warrant grouping together in a separate class. Part III, "Some Problems in the Physical Sciences," contains three papers that deal with theoretical and practical aspects of measurement in classical and modern physics, plus a paper on "rare events" that is out of place in this volume. Part IV, "Some Problems in Social Science," contains only two papers, one on inconsistency of judgments as a measure of psychological distance and one having to do with experimental tests of a probabilistic theory of economic behavior.

There are in all fourteen contributors, one paper being co-authored. The disciplines they represent are: philosophy (5), psychology (3), psychophysics (1), physics (2), mathematics (1), statistics (1), economics (1), and accounting (1). Philosophy is thus somewhat over-represented; astronomy, the biological and earth sciences, not at all.

In the Preface it is stated that the Symposium "was designed to present contrasts in approaches to the problems of measurement." To this end, "the partici-