BOOK REVIEWS

Introduction to Fourier analysis and generalised functions. By M. J. Lighthill. New York, Cambridge University Press, 1958. 8+78 pp., $3.50.

The theory of generalised functions (distributions) is playing an ever increasing role in modern analysis. Therefore, an elementary but rigorous account of this theory for advanced undergraduates is a welcome addition to the more advanced and comprehensive books of Laurent Schwartz [*Théorie des distributions*, vols. 1 and 2. Paris, Hermann et Cie, 1950–1951]. In addition to presenting the basic results on Fourier transforms and series via distributions, the author develops a simple, systematic method for estimating asymptotically Fourier transforms and coefficients for a wide class of functions. Unfortunately, the author gives the impression that the delicate and interesting questions of the classical theory can be dispensed with by employing distributions. Of course, this is only true to the extent that he is only concerned with questions which are more easily investigated in the framework of a theory based on distributions.

The material in this book could easily be covered in a one-semester course. Many students might find the pace a bit too strenuous without sufficient amplification since the proofs and examples are in the main only sketched. The examples are quite good but, for a text, there are too few exercises.

The book contains five short chapters. The first chapter is of an introductory nature designed to motivate the use of a generalised function approach to Fourier analysis. Starting with a brief account of the theory and applications of Fourier transforms and series, the author then emphasizes the inadequacy of the classical theory to permit many of the formal operations needed in most applications. An indication is given of the wider applicability of a theory of Fourier analysis based on distributions.

The basic theory of distributions and their Fourier transforms is the subject matter of the second chapter. Distributions are defined in terms of sequences following Temple [J. London Math. Soc. vol. 28 (1953) pp. 134–148]. More precisely, a distribution is defined as a sequence of "good functions" (i.e., infinitely differentiable functions with rapid decay at infinity) with the property that the sequence of linear functionals they define on the class of "good functions" be convergent. These correspond, roughly, to the so-called "distributions tempérées" of L. Schwartz. The definition of a distribution is