

polation, published in 1923. They furnish a practical reference book on interpolation with equal and with unequal intervals, central difference formulas and applications. These four chapters are followed by a short one on Chio's method of computing the numerical value of a determinant.

The chapter on the numerical solution of algebraic and transcendental equations describes, illustrates and compares the more important methods. One might wonder if the value of an up to date calculating machine is fully appreciated at the Laboratory. The computation of the successive values satisfying a difference equation is especially well adapted for machine computation, and the successive values of S_p (the sum of the p th powers of the roots of an equation) can be ground out with uncanny readiness by one who has had a little experience. Then, using Bernoulli's method, the quotient S_{p+1}/S_p can be obtained to as many decimals as may be desired. The computing machine is also invaluable in constructing tables of differences.

There are also chapters on Numerical Integration, Normal Frequency Distributions, Least Squares, Fourier Analysis, Smoothing of Data, Correlation, Search for Periodicity and the Solution of Differential Equations. These subjects are all given with satisfying clearness and detail with plenty of examples, and sample solutions. The whole book presents evidence on every page of sound scholarship and good practical judgement. The authors call attention to the opportunities for research in the subject of numerical mathematics. "There is an evident need for new and improved methods of dealing with many of the problems discussed in the later chapters".

D. N. LEHMER

Les Lieux Géométriques en Mathématiques Spéciales avec Application du Principe de Correspondance et de la Théorie des Caractéristiques à 1,400 Problèmes de Lieux et d'Enveloppes. By T. Lemoine. Paris, Vuibert, 1923. 146 pp.

This little pamphlet summarizes Chasles' theory of characteristics together with the extensions which the author (with Brocard) developed in volume I of *Courbes Géométriques Remarquables*, and gives 1400 problems by way of illustration. It will be recalled that the characteristics μ , ν of a system of conics refer to the number of conics which pass through an arbitrary point, and are tangent to an arbitrary line, respectively. The characteristics of 170 systems of conics, and of 41 systems of circles are listed. Fundamental theorems give formulas for the order or class of many loci or envelopes connected with these systems in the form $\alpha\mu + \beta\nu$. Chasles gave 32 such fundamental theorems for the values of α and β ; Lemoine adds about 50 more, either with proofs or with references to the *Courbes Géométriques*