

of  $p$  as high as the limit 99,989. Similar tables are also given for the smallest values of  $y$  satisfying the congruence

$$\frac{y^{2n}+1}{y^n+1} \equiv 0 \pmod{p}$$

for various values of  $n$  and various limits of  $p$ . Volume IV also contains tables of roots  $(x_1, x_2)$  of  $x_1^n + x_2^n \equiv 0 \pmod{p}$  for various values of  $p$  and  $n$ .

The first volume contains also factorization tables giving the factors of a vast number of numbers of special forms. They will be found somewhat difficult to use on account of the new names that confront the reader on every page. One meets here not only "Pellians" with new and strange prefixes, but also "Aurifeullians" of various families. One stands a bit daunted before a "Dimorph-Bin-Aurifuellian". Out of this rather confusing mass of computation emerge, however, some usable tables giving values of  $y$  which make  $y^2+1$ ,  $(y^2+1)/2$ ,  $(y^3-1)/(y-1)$ , etc. take on prime values. There are also tables giving values of  $x, y$  which make  $x^n+y^n$  a prime or twice a prime. These tables go much beyond the limits of available factor-tables.

There is no room for doubt that Lt.-Col. Cunningham has undertaken and carried out an immense task, of value in the problem of identifying large primes, and in the breaking down of numbers of special forms into their prime factors.

D. N. LEHMER

*The Calculus of Observations. A Treatise on Numerical Mathematics.*

By E. T. Whittaker and G. Robinson. London, Blackie and Son, Ltd., 1924. 16+395 pp.

"The present volume represents courses of lectures given at different times during the years 1913—1923, by Professor Whittaker to undergraduate and graduate students in the Mathematical Laboratory of the University of Edinburgh, and may be regarded as a manual of the teaching and practice of the Laboratory, complete save for the subject of Descriptive Geometry."

To the teacher of mathematics, in this country at least, a mathematical laboratory will be apt to suggest graphical and nomographical methods. In this book the work is almost entirely arithmetical, and we are told that in the University of Edinburgh graphical methods have almost all been abandoned "as their inferiority has become evident". This result of actual experience covering some ten years will perhaps come as a surprise to many teachers and practical computers to whom such methods appeal especially where great speed is very desirable and only rough approximations are necessary.

The first four chapters deal with the theory of interpolation, and are obtainable in a separate issue entitled *A Short Course in Inter-*