Some of these criteria might perhaps have been stated to better advantage in terms of the derivatives of the logarithms of $f(x)$ and $\phi(x)$. The book ends with a consideration of the indeterminate forms $\infty - \infty$, 1^{∞}, etc.

Taken as a whole, the book is not only clear, readable, and fairly thorough, but has a good set of references to other works and a rich list of problems which may be useful in elementary calculus courses. It therefore seems to deserve a place in any fairly complete mathematical library.

OSWALD VEBLEN.

Abstrakte Geometrie. By KARL THEODOR VAHLEN. Leipzig, B. G. Teubner, 1905. xi + 302 pp.

A book following the general outline of Vahlen's Abstrakte Geometrie would be very useful for giving a general view of the recent studies on foundations of mathematics. This is sufficiently indicated by the titles of the chapters: I, Foundations of arithmetic; II, Projective geometry (theorems of connection); III, Projective geometry (theorems of order); IV, Affine geometry (euclidean and non-euclidean); V, Metric geometry.

Unfortunately, however, the book is not characterized by that precision of language which is indispensable in any discussion of such a subject. The reader is constantly confronted with statements which are incorrect if taken literally and which, if not taken literally, are open to more than one interpretation. Many of the author's postulates are labeled by him as definitions. Moreover, there are places where it is very difficult to determine which of the previously stated hypotheses are being used and which are not. As a consequence, the reviewer is able to state hardly a single new *result* which is surely established by this book.

On the other hand, there are many *suggestions* of methods which if rigorously carried out would probably lead to interesting and elegant results. For example, the notion of planar order is defined not by means of coördinates as in the usual analysis, nor by the way in which a straight line intersects a triangle (according to Pasch) but by means of postulates in terms of the right and left sides of a line with respect to a given sense on the line. One is thus enabled to deal at once with the most general type of planar-ordered set without presupposing anything about a plane in which it lies.

For suggestions such as the one mentioned, the book may be recommended to anyone who is already familiar with other works on the foundations of geometry, but for a beginner it would be thoroughly misleading, and to a philosophical outsider who wished to learn the methods and ideas of the logic of mathematics it would give some very queer notions indeed.

It seems to the reviewer not to be worth while to lengthen this notice with criticisms of details, especially as many of the points that would be mentioned have already been adverted to by Dehn in a review published in the *Jahresbericht der Deutschen Mathematiker-Vereinigung*, volume 14, page 535. The reader who is interested in such things will find a rejoinder to Dehn by Vahlen on page 591 of the same volume, a retort by Dehn on page 595, and a second "Erwiderung" by Vahlen in volume 15, page 73. With these he may compare a footnote by Schoenflies on page 31, volume 15.

OSWALD VEBLEN.

Quadratic Partitions. By Lt. Col. ALLAN CUNNINGHAM, R.E. London, Francis Hodgson, 1904. xxiii + 266 pp.

THE main tables in the book under review contain the quadratic parts (t, u) of the partitions

$$p = t^2 \pm Du^2,$$

wherever possible, for all values of $D < 20$ $(D \neq k^2 \cdot \delta)$, and for all primes p to various limits not above 100,000. Shorter tables at the end of the book contain solutions of the Pellian equations

$$\tau^2 \pm Dv^2 = \pm 1, \quad \pm 2, \quad \pm 4, \quad \pm 8, \quad \pm 16$$

for various values of D not over 1,000.

In the Introduction the author gives a brief, but excellent sketch of the properties of quadratic forms, and describes methods of applying the present tables to factorizations, the calculation of Hauptexponenten and kindred problems.

Comparing it with the earlier tables of Jacobi and Reuschle, the student of number theory cannot fail to be impressed with the excellence of Col. Cunningham's book. Neatness, freedom from errors, and admirably compact arrangement of tables of such extent add to their appearance as well as their usefulness. The odd primes are printed *forty* on each page, an arrange-