

We will close now our review regretting its inadequacy to give but a faint idea of the merits of this great work. A classic from the day of its publication, it is destined to a long and useful career, a monument of honor to its genial author.

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SHORTER NOTICES.

Analytic Geometry for Technical Schools and Colleges. By P. A. LAMBERT, M.A., Instructor in Mathematics, Lehigh University. New York, The Macmillan Co., 1897. 8vo, 216 pp. Price, \$1.50.

The volume before us differs greatly in the choice and arrangement of material from the standard English textbooks on analytic geometry, and clearly shows the influence of Briot and Bouquet's "Géométrie Analytique." In the first few pages Cartesian coördinates are defined, and exemplified by curves plotted from tables of statistics. In the second chapter the straight line, the circle, the conic sections, the ellipse, the hyperbola, and the parabola are allotted a paragraph each, and the student is hurried on in Chapter III. to the plotting of algebraic equations, and in Chapter IV. to the plotting of transcendental equations.

The discussion, at this early stage, of the curves represented by the exponential, logarithmic and circular functions, the cycloids, etc., should be of interest to the beginner, and shows the reaction against the undue prominence frequently given to the conic sections in works on elementary geometry. It would be absurd to expect a thorough treatment of the theory of curve-tracing in such limited space, but one or two unnecessarily misleading statements might have been avoided. The tangent is defined as a secant having two points of intersection with the curve "coincident," instead of consecutive, and a similar misuse of terms occurs in defining a point of inflection. The point of inflection is the only singularity discussed, therefore the distinction between the analytical conditions for a point of inflection and a double-point, often a question of some difficulty to the young student, is not touched on.

The algebraic equations are taken in the form $y = f(x)$, and the point of contact of an asymptote parallel to the axis of y is called a "point of discontinuity." It seems a pity to use the word "discontinuity" in this sense since the idea of the continuity of algebraic curves is important and helpful in curve-tracing.

Chapters V. and VI. deal with transformation of coördinates, Chapters VII., VIII., and IX. with properties of the straight line, the circle, and the conic sections. The choice of an unusual notation, viz.:

$$ax^2 + 2bxy + cy^2 + 2dx + 2ey + f = 0,$$

for the general equation of the second degree lends an air of unfamiliarity to Chapter X. The two following chapters on line coördinates and the complex variable complete the first section of the book. The invention of the graphic representation of the complex variable is ascribed to Argand, though it has now been found that Caspar Wessel was the first to use the method.

The second section of the work, consisting of 45 pages, is on Analytic Geometry of three Dimensions; it is, however, little more than a summary of a few important theorems in the earlier part of the subject. An unfamiliar notation is again used for the general equation of the second degree; its reduction is given in a very condensed form, and no mention is made of several special cases, for instance, the pair of planes. Ellipsoids and hyperboloids are called surfaces of the first class; paraboloids, surfaces of the second class; and cylindrical surfaces, surfaces of the third class. This is rather an arbitrary division, and it would be better to reserve the terminology for surfaces to which one, two, or three tangent planes can be drawn through a line.

The book as a whole, though interesting and suggestive from a pedagogical standpoint, is so cursory and incomplete as to be of little value to the student who has not the advantage of thorough teaching to supplement it. The analytical work might have been arranged more neatly and a knowledge of determinants assumed. Numerous simple examples, historical notes and references to physical applications are given; the latter will be appreciated by teachers, but are—as they stand—over the heads of pupils at the stage presupposed by the general style of the book.

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