

own definition.* A better definition would be composed of the two parts†

$$(a = b) \notin (a \notin b)(b \notin a), \quad \text{and} \quad (a \notin b)(b \notin a) \notin (a = b).$$

The equality sign is used however before Axiom III is given. In part two, *Aussagentheorie, Funktionen, Gleichen und Ungleichen*, the author derives and discusses at length the general formulas for the symbolic sum and product, and the methods of substitutions and reduction of symbolical functions with the methods of elimination and solution of the general symbolical equation. This part is quite extensive and there is much that is obvious.

One good feature of the work, at least from the standpoint of the mathematician, is the numerical or algebraical examples, illustrative of the general theory, used throughout the book. The *Abriss* on the whole is a very creditable piece of work and cannot but help arouse interest in the algebra of logic. No serious errors occur, but there are some obvious misprints of the type found in line three, page thirteen, where a in the last parenthesis should be α .

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Cours d'Astronomie. Première partie: Astronomie théorique.
Par H. ANDOYER. Deuxième édition entièrement refondue.
Paris, Librairie scientifique A. Hermann. 383 pp.

THE first edition of this work in hectographed form has been reviewed in volume 13, number 10, of the *BULLETIN*.‡ The second edition is much enlarged, almost doubled in size. The number of chapters is increased from fifteen to nineteen. The work in its present form is subdivided into four large sections, or books, of which the first is of a more analytical character. The transformation of coordinates with common origin—spherical trigonometry—is given with considerable completeness; to it is added the transformation for different origins and parallel systems of axes—the analytical basis for parallax and aberration. The second book defines the adopted systems of coordinates in astronomy, the concepts of sidereal and solar

* A similar fallacy is evident in axiom VI \times . It would be difficult to avoid this in a simple way.

† A combination of his III', III'' and III'''.

‡ See also the review of the second part, by Professor Longley, *BULLETIN*, vol. 15, pp. 467-468.

time, and gives, as an application of the theories of the first book, the theories of parallax and aberration themselves. This book contains likewise some fundamental notions about geodesy, which is in proper bearing with the greater extent with which the theory of spherical trigonometry has been given in this work. That the theory of refraction is likewise included in this second section is of course due to the fact that the correction for refraction comes, in the order of application, even before those for parallax and aberration. The third book opens with a rather complete study of certain fundamental notions of celestial mechanics which are made use of in the theory of precession and nutation and of time, all of which theories are set forth in this section. The geocentric motions of planets and satellites, including the moon, complete the third book; their inclusion, in the text before us, is much to be commended, since the older textbooks on this subject give almost no attention to them. Inasmuch as observations of eclipses of moon and sun and occultations of stars define certain directions in space, to which the usual corrections are to be applied, the last section of the work is devoted to their theories. Moreover the theory of transformation of coordinates finds in the prediction of the times of eclipses an extensive field of application.

The name of the author and the reputation of the publishing house are from the start sufficient guarantees for the excellent character of the book. As far as has been possible to ascertain, typographical errors of any importance seem to be happily avoided; that the types for the fractional lines have not always been perfect is perhaps the only criticism one can make of the typographical appearance of the book. The introduction of a general index and copious references at the end of chapters would have been a distinctive improvement; as it stands, the beginner is likely to miss the historical setting, and permit himself to be carried too much by the "ipse dixit" of the author. It is believed that the mathematician, interested in the subject, will find Professor Andoyer's book extremely attractive, since everywhere the underlying mathematical principles are strongly brought into the foreground. His attention is especially called to the chapter on refraction, in which Radau's presentation is given in preference to those of Laplace, Bessel, or Ivory. A simple reference to Bruhns's *Atmosphärische Strahlenbrechung* would have supplied the

reader with a pretty complete literature of this highly interesting subject.

The reviewer would have liked to see a chapter on interpolation and related subjects form part of the book, since an intelligent use of the Ephemerides is not to be thought of without a mastery of this topic. The astrophysicist will be somewhat disappointed by not seeing the transformation of velocities included in the third chapter of the book. The student interested in the photometric measurements of the satellites of Jupiter after Pickering and Sampson might well claim that the theory of the photometric eclipses is surely as important as the passages of Mercury and Venus over the disc of the sun, to which the author has devoted 8 pages. Finally in the subject of differential refraction a recognition of the peculiar formulas for measurement of photographic plates might not have been entirely out of place.

KURT LAVES.

NOTES.

At the meeting of the Edinburgh mathematical society on May 10 the following papers were read: By W. P. Milne, "Investigations on circular cubics and bicircular quartics"; by G. Teixeira, "Notice sur les recherches de Maclaurin concernant les cubiques circulaires"; by H. T. Pioggio, "Note on linear differential equations with constant coefficients."

THE annual meeting of the Deutsche Mathematiker-Vereinigung will be held in affiliation with the eighty-fourth convention of German naturalists and physicians at Münster in Westphalia September 15-21 under the presidency of Professor W. v. DYCK. While papers in other subjects will be welcome, particular emphasis will be put upon reports and new contributions to the theory of differential geometry. Information regarding the meeting can be obtained from the secretary, Professor A. Krazer, Karlsruhe, Westendstrasse 57.

THE Macmillan Company announce the publication during the summer of a work on the calculus by Professors E. W. DAVIS and W. C. BRENKE, of the University of Nebraska.

THE second volume of Professor J. PIERPONT'S Theory of functions of a real variable is in press and will be published by Ginn and Company in July.