The first part ends with the transcendental theory along the line of Picard's *Traité d'Analyse*, with some asides on real curves and questions of reducibility of abelian integrals, in which direction the author has also made important contributions.

We now come to the Anhang. The volume was ready in August, 1914. In the years that followed, the author, part of the time in active military service, was pursuing investigations on algebraic curves and these with some minor corrections form the subject-matter of the Anhang, which occupies the latter fourth of the work. In form it differs considerably from the rest and in ordinary times we should have expressed the wish to have it more completely merged with the rest, but no doubt this would have greatly delayed publication, and under the circumstances we feel thankful to have it as it is.

The Anhang is certainly the most interesting part of the work for the student of this subject, the one which he will want to read first. Greater preparation is required to read it than for the rest. The material, as interesting as it is new, consists primarily in a series of contributions to our very meager knowledge on families of algebraic curves with singularities assigned in type but not in position. A typical as well as interesting result is this: The manifold of all irreducible curves of given order and genus is itself irreducible. His results along this line lead the author to the first algebraic-geometric proof ever given of Riemann's existence theorem, and also to a new attack on the classification of curves in any space.

May this suffice to whet the reader's appetite and increase his desire to read Severi. He will not repent.

S. LEFSCHETZ.

Theoretical Mechanics. An Introductory Treatise on the Principles of Dynamics with Applications and Numerous Examples. By A. E. H. Love. Third Edition. Cambridge, University Press, 1921. xv + 310 pp.

The first edition of Love's Mechanics was published in 1897 and was reviewed in this BULLETIN in April, 1898. The second edition, published in 1906, differed from the first in that the material had been rearranged and rewritten, although the general content remained unaltered. The present edition is practically the same as the second, the only additions being a note on *The moment of the kinetic reaction of a particle about a moving axis*, a paragraph on *Force of simple harmonic type*, and a paragraph on *Effect of damping on forced oscillation*. The number of miscellaneous examples has been reduced, although the collection is still sufficiently large to satisfy the demands of the most ardent problems enthusiast.

As the first and second editions have been familiar to students of mechanics for so many years, no further comment seems necessary.

PETER FIELD.

Zur Theorie der Triaden, von Almar Naess. Kristiania, Grondahl & Sons, 1921. 136 pp.

This paper of 136 pages forms Nr. 6, Serie 1, of NORSK MATEMATISK

FORENINGS SKRIFTER, is clearly and fully written, and very interesting reading. An excellent outline of the properties of vectors and dyadics covers 32 pages. A triadic is then defined, as in the Gibbs-Wilson vector analysis, to be a sum of terms of the form $\boldsymbol{abc}$ where $\boldsymbol{a}$, $\boldsymbol{b}$, and $\boldsymbol{c}$ are vectors, and it is shown that the most general triadic can be written $\boldsymbol{i}\Psi_1 + \boldsymbol{j}\Psi_2 + \boldsymbol{k}\Psi_3$, where $\boldsymbol{i}$, $\boldsymbol{j}$, and $\boldsymbol{k}$ are rectangular unit vectors and Ψ_1, Ψ_2, and Ψ_3 are dyadics. It is this latter, semi-cartesian, form which is chiefly used in obtaining the results which follow.

It is a little surprising that, in a work otherwise so clearly permeated with the spirit of Gibbs, not more use is made of the first definition, from which, for example, the conjugate systems would follow much more compactly; for they are equivalent to permutations of the vectors in $\boldsymbol{abc}$. If this be a fault, however, it is merely one of procedure, and in no sense implies any criticism of the spirit, purpose, or results of the work. A large number of identical relations are obtained, which appear to be useful, and these are frequently given in a final form free from the arbitrary units $\boldsymbol{i}$, $\boldsymbol{j}$, $\boldsymbol{k}$, frequently in determinant form, often very elegantly conceived. In short, the semi-cartesian method is employed with great skill and leads naturally to the cubic matrix of the triadic. It would have appeared equally natural to introduce the cubic determinant. Dot products of triadics, and other products leading to tetradics, are also avoided.

An excellent feature is the continual application of the formulas to the differential operator (given its original name of Nabla). Students of vector analysis and related methods will await with interest further developments from the same pen.

F. L. HITCHCOCK.

Untersuchungen über das Endliche und das Unendliche. By C. Isenkrahe. Bonn, Marcus and Weber, 1920. Erstes Heft, viii + 224 pp.; zweites Heft, viii + 230 pp.; drittes Heft, ix + 245 pp. 16 mks. each.

These three divisions of the book under review are entitled:

1. Three detailed discussions of questions in the borderland between mathematics, natural science, and the theory of belief. 2. The teaching of St. Thomas as to the infinite, its application by Prof. Langenberg, and its relation to modern mathematics. 3. Letters between Sawicki and Isenkrahe on a problem in infinity, which is fundamental in the apologetic proof of entropy. The three divisions consist almost entirely of controversial matter in reply to various criticisms passed upon writings of Isenkrahe by Hartmann and others. Not much gain for the subjects under discussion is visible, much of the controversy seeming to relate to different uses of the terms. The discussions are of little interest mathematically. The author seems called upon to defend certain views for the sake of their possible religious significance. Recriminations of orthodoxy and unorthodoxy are found in places, and the argument waxes hot occasionally,—as one might expect.

J. B. SHAW.