The last chapters of volume I deal with equations of third and fourth degree and other special equations. In volume II the ordinary fundamental theorem of algebra is proved. Then the Galois theory for all polynomials of the first class is very extensively developed and additional considerations solve the difficulties for polynomials of the second class. This volume contains various subjects new to textbooks. I will only mention the mutual reduction of polynomials and the determination of equations without *affect.* In an addendum Krull studies the Galois theory of algebraic fields of infinite rank, generalized Abelian groups, and their application to the theory of matrices and elementary divisors.

The author assumes that the book should be used for a first textbook in advanced algebra. It seems to me, however, that such a book can only be appreciated by students who already have a rather thorough knowledge of algebra; for a beginner in the subject many of the considerations might look like unnecessary complications and formalities. In general, an axiomatic theory very often has a depressing influence on a reader who is not familiar with the general plan of the building he is going to cooperate on. By taking this attitude the author could have omitted some of the more elementary parts of the book and saved space for other items like, for example, divisibility and the theory of rings. This is, however, no serious reproach to this remarkable book.

OYSTEIN ORE

Mathematical and Physical Papers. By Sir Joseph Larmor. 2 volumes. Cambridge, University Press, 1929. Vol. 1, xii+679 pp., vol. 2, xxxii+831 pp.

The purely mathematical papers form but a small part of the author's work; they were written mostly in the eighties and deal with the geometry of quadric surfaces, transformations of integrals, and the formal aspects of various methods in mathematical physics.

Foremost among the author's contributions to physics are the three, now classical, papers on *A dynamical theory of the electric and luminiferous medium.* Adopting for the electric energy function the form first used by MacCullagh in optics, the author develops the most complete ether theory of electromagnetism ever devised, and correlates it with thermodynamics, kinetic gas theory and other branches of theoretical physics. Much space is given to the theory of the electron, and there are many results in common with the investigations pursued by Lorentz about the same time by different methods. One of the best known of Larmor's results, which has recently acquired added significance in quantum mechanics, is the "Larmor precession" of the orbit of an electron in a constant magnetic field.

Next in importance to the electromagnetic papers are those on general thermodynamics and the theory of gases. There are also a number of papers on geophysical questions, and various reports and addresses.

Larmor handles his mathematics with elegance, but the outstanding features of his work are the clarity and power of his physical reasoning, and the definiteness and comparative simplicity of his mechanical models. A valuable feature of the present edition is the extensive series of historical and critical notes contributed by the author. The printing is in the familiar style of the Cambridge University Press, with the added luxury of a marginal index.

T. H. GRONWALL

Euclides Danicus. By Georg Mohr. Amsterdam, 1672. Copenhagen, Høst, 1928. Price $2.50.

Towards the end of the eighteenth century Mascheroni arrived at the amazing conclusion that all euclidean constructions may be executed with compasses alone, without the aid of the ruler. This was the starting point for the study of the rôle of instruments in geometric constructions, so successfully carried out during the nineteenth century. But Mascheroni's book *Geometria del Compasso,* (Pavia, 1797), remained the standard work on Mascheronian constructions. It has been superseded only very recently (A. Quemper de Lanascol, *Géométrie du Compas,* Paris, Blanchard, 1925).

Had Mascheroni died in childhood would science have been deprived foreever of Mascheronian geometry? Usually such a question is a moot one. Not so in this case. In 1672 a Danish mathematician, Georg Mohr, published a book in Dutch and in Danish simultaneously, which contains Mascheroni's basic result and a good many of his problems. Little is known about Mohr. Leibnitz mentions him in one of his letters. Mohr's book passed completely unnoticed. Mascheroni says explicitly in the preface of his *Geometria* that he knows of no previous work of this kind. There is no reason to doubt his word.

Due to the efforts of J. Hjelmslev, the Danish Scientific Society has published a facsimile copy of the Danish edition of Mohr's book together with a German translation of it. The Danish Society deserves to be congratulated for having rescued this book from oblivion. While the book does not add to our geometric knowledge, it is an interesting historical document, in more than one respect. The typography of the book is excellent.

N. A. COURT

Hoehere Mathematik. Teil I. *Differentialrechnung und Grundformeln der Integralrechnung, nebst Anwendungen.* By Rudolf Rothe. 3d edition. Leipzig, B. G. Teubner, 1930. vii+189 pp.

This edition differs but little from the first and second editions (reviewed in this Bulletin, vol. 31, pp. 556–7, vol. 33, p. 791). The changes consist of a few alterations and corrections in the text, the addition of a paragraph relating to moments, which might well have received more extended treatment in volume II, a paragraph in the discussion of Taylor's formula, and a paragraph deriving Lagrange's rule for maxima and minima of functions of more than one variable with supplementary condition, in which the author assures us that the vanishing of the jacobians: $\partial(f,g)/\partial(x,z)$ and $\partial(f,g)/\partial(y,z)$ is equivalent to the existence of a *constant* λ such that $\partial f/\partial x+\lambda\partial g/\partial x=\partial f/\partial y+\lambda\partial g/\partial y=\partial f/\partial z+\lambda\partial g/\partial z=0$.

T. H. HILDEBRANDT

Analytische Geometrie. By L. Bieberbach. Leipzig and Berlin, Teubner, 1930. iv+120 pp.

This little book (volume 29 of Teubner's Mathematische Leitfäden) presupposes an elementary knowledge of the subject. The novelty of the treat-