*Lehrbuch der Algebra, verfasst mit Benutzung von Heinrich Webers
gleichnamigem Buche.* Erster Band: *Allgemeine Theorie der algebra-
ischen Gleichungen.* ByRobertFricke.Braunschweig,F.ViewegundSohn,
1924. viii + 468 pp.

When the last edition of the *Lehrbuch der Algebra* by the late
H. Weber became out of print, the publishers invited Professor Fricke
to write a treatise on algebra in three volumes to replace that by Weber.
The subject matter of the present volume 1 is essentially the same as
Weber's volume 1 and the earlier chapters on abstract groups in Weber's
volume 2. Fricke states that his second and third volumes will differ
more essentially from those by Weber. Volume 2 will treat those algebraic
equations which are not solvable by radicals and possess groups represent-
able by binary and ternary substitutions; in particular, Klein's theory
of the icosahedron and equations of the fifth degree will be presented
from the geometrical standpoint of Klein (in contrast to Weber's algebraic
treatment). Volume 3 will develop the theory of algebraic numbers and
the class equation of complex multiplication of elliptic functions.

Professor Fricke is an experienced writer of unusual clearness. In
addition to his recent book on elliptic functions, he was joint author
with Klein of extended treatises on elliptic modulur functions and
automorphic functions. These earlier books show that the author has
long been familiar with the field covered by the new algebra. The
latter will be somewhat simpler to read than Weber's algebra. General
determinants are given a better notation, and their rank is employed
systematically, thus avoiding the circumlocution of Weber. Certain
proofs are replaced by simpler or more natural ones; for example, the
product of two determinants, and the determination of the number of
positive signs in the canonical form $\sum \pm x_i^2$ of a quadratic form.

There are brief treatments of the following topics omitted by Weber:
k-fold bordered determinants, linear dependence, rank of symmetric
matrices, besides the additions on pages 6–7, 10–13, 67.

Certain topics in Weber are omitted by Fricke: elimination of two
unknowns from three equations; domains defined by an imaginary cube
root or fourth root of unity; most of Weber's chapter 11 on continued
fractions (perhaps those domains and the theory of the equivalence of
quadratic numbers will be treated in volume 3).

Although the general theory of transformations of Tschirnhaus is
developed at length, there is no mention of the chief application to
the reduction of the general equation of the fifth degree to a normal
form involving a single parameter, whether the Bring-Jerrard form
$y^5 + y + c = 0$ or the still more important Brioschi form. Doubtless
these normal forms will be given in volume 2. But it is far preferable
that the reader should meet them as the culmination of the elaborate
theory of transformations of Tschirnhaus (Weber I, 2d ed., p.205, p.263)

Since the present volume covers nearly all the ground of Weber's volume 1 of 703 pages, as well as the first two chapters (of 68 pages) on abstract groups in Weber's volume 2, it may seem strange that Fricke's present book contains only 461 pages, besides the index. But Fricke's pages are larger than Weber's and the type is materially smaller.

The owner of a copy of Weber's algebra who uses it chiefly as a reference book will not find it essential to buy Fricke's book. But a person who expects to do considerable reading in one of these books will find it to his advantage to own the simpler book by Fricke. The advantage in favor of Fricke's volumes 2 and 3 will doubtless be relatively greater than in the case of volume 1.

It is a pity we do not have in English a treatise on algebra as good as either Weber's or Fricke's.

L. E. DICKSON

Leçons de Géométrie Élémentaire. By Édouard A. Fouët. Paris, Vuibert, 1924. xvi + 348 pp.

This is an elementary geometry for pupils who are familiar with theorems *les plus simples* on the straight line and circle. It consist of eight books: I and II on the straight line and circle, III on similar figures, IV on plane areas, V on the plane and line, VI on polyhedra, VII on the sphere, cylinder, and cone, VIII on the conic sections; together with a preliminary book (to be read last, or at least later), a résumé of definitions, transformations, loci, and methods for solution of problems. Intermingled in each book are paragraphs of three distinct natures, (1) an ordinary course in geometry, (2) a course in problems, (3) an excellent set of pedagogical and historical notes.

The ordinary course (1) needs only the obvious commentary that like most similar Continental works it is incomparably better than American geometries in the development of broad underlying principles. In appropriateness of application and in development of power the problem course (2) compares favorably with even such a specialized book as Petersen's *Methods and Theories for the Solution of Problems of Geometrical Construction*, while in wealth of advanced material it is only slightly inferior to Hadamard's *Leçons de Géométrie Élémentaire*. A superior book; but demanding superior teaching, for the course (1) must be accompanied by not too difficult problems (of which there is perhaps a scarcity), and those demanding more maturity must be left until later. But still these last are there, forming a part of the text, not grouped at the end of the chapter or book. This is perhaps the outstanding feature of this text.

B. H. BROWN