given, 1.07, seems to be the result of hasty work; accurate use of the trapezoidal rule yields 1.103, as compared with the exact value, 1.0894, obtained by the aid of Γ functions and verified by Simpson's rule with five ordinates. The error due to the trapezoidal rule is nominally only 1.3 per cent., but inspection shows the area to be a unit square surmounted by a small area, and for this latter even an accurate use of the rule suggested results in an error of about 15 per cent. Such approximate integration seems unsatisfactory to the reviewer, although it must be admitted that other books appear to sanction it.

The points open to criticism—the too orderly arrangement, inaccuracies in certain answers, and undesirable features in a few problems—are flaws which limit rather than destroy the usefulness of the book. It is certain that many teachers will find it convenient to put in the hands of students for supplementary work, and more will find it a very satisfactory source from which to draw, for classroom work or tests, problems which will be new to their students.

R. W. BURGESS.

Vom periodischen Dezimalbruch zur Zahlentheorie. By ALFRED LEMAN. Leipzig, Teubner, 1916. iv+59 pp. Price 80 Pfennige.

THE aim of this little book is to present the main properties of periodic decimals as material for a concrete introduction to the more elementary topics of the theory of numbers. The concept congruence is introduced on page 16 and Fermat's theorem is presented, illustrated and proved on pages 21–23, —each topic being a natural sequel to concrete questions and results concerning periodic decimals.

Periodic fractions to bases other than 10 are treated briefly in the final chapter 8, although on page 51 this part of the theory is said to be treated in chapters 8 and 9.

There is a list of about 15 papers, including most of the earliest ones. There is no mention of the early MS. by Leibniz; Henry Goodwyn's tables, 1816–23; the papers by Poselger, 1827; Bredow, 1834; Midy, 1836; Catalan, Thibault, and Sornin in *Nouvelles Ann. Math.*, 1842, 1843, 1846; Desmarest's text, 1852; Hudson's excellent paper in Oxford, *Cambridge and Dublin Messenger of Mathematics*, 1864, pages 1–6—not to cite various earlier papers and a hundred later ones. The topic is not exhaustively treated as claimed.

In the notes on page 54, the statements concerning perfect numbers and the largest known prime are not up to date.

However, the author has succeeded in his aim to write an attractive account of the main properties of periodic decimals and to use that topic as a concrete means to acquaint the immature reader with some important theorems of the theory of numbers and to arouse his curiosity to pursue the theory further.

L. E. DICKSON.

Compendio de Álgebra de Abenbéder. Texto árabe, traducción y estudio por JOSÉ A. SÁNCHEZ PÉREZ. Madrid, 1916. (Junta para Ampliación de Estudios e Investigaciones cientificas, Centro de Estudios históricos.)

THE translator, who has an enthusiastic hope that some day an adequate history of mathematics in Spain will be written, sees in this manuscript a contribution of material for such a book. But the translation is of value for another reason: it makes accessible to the mathematical world in general another of the works compiled by the Mussulmans between the eighth and fifteenth centuries. Sr. Pérez begins his introduction with a brief account of certain phases of the history of mathematics in his own country and closes it by thirty pages of discussion of questions relating to the contents of this document and its authorship and date.

The Compendio de Álgebra is contained in manuscript 936 of the Escurial library (Arabic section). There are forty-six folios in Arabic characters of Spanish type. The date, as given in the document, is the year 744 since the Hegira. Abenbéder understands that the object of algebra is the solution of equations. He explains his subject in the form of ordinary discourse, without employing the notations of algebra. The work is divided into two parts—the theoretical and the practical. In the former, the first six "questions" treat the six forms of equations given by Al-Khowarizmi. Some of the particular equations used are those met with so frequently in these early texts: for example, (in our notation) $x^2 + 10x = 39$ and $x^2 + 21 = 10x$. There are also six "chapters" explaining the fundamental operations with the square roots of numbers and six others dealing with the rules of signs and with the squares and cubes of the unknowns.