$f(x) = x[x]$, ($[x]$ indicating the largest integer contained in x), is an example of a function which is discontinuous at points for which x is an integer, but whose derivative is continuous.

$f(x) = x[1/x]$ is an example of a function which is discontinuous at points where x is an integer and whose derivative is also discontinuous at these points.

The chapter on the applications of the differential calculus contains nothing more than the applications to indeterminate forms and maxima and minima. It seems rather unfortunate that Taylor's and Maclaurin's series should be omitted entirely.

The part of the book dealing with algebra contains a chapter of forty pages on determinants, and a chapter on algebraic equations which treats of resultants, discriminants, and the solution and discussion of numerical equations.

The last 140 pages are devoted to analytical geometry. It is rather remarkable to note that geometric loci are discussed on the fourth page, the equations of the conics, strophoid, cissoid, Cassinian ovals, and four cusped hypocycloid being derived as examples in loci. The particular equations of the line and conic are then taken up and discussed in detail. The treatment of analytical geometry is satisfactory indeed.

The book as a whole is well adapted to the purpose for which it was written, but as is usually the case with the European text it does not contain a sufficient number of exercises and problems which are left for the student. Throughout there are many footnotes, mostly of a historical nature, which are sufficient to arouse an interest in the history of the subject.

C. L. E. MOORE.

Récréations Mathématiques et Problèmes des Temps Anciens et Modernes. Par W. W. ROUSE BALL. Deuxième édition française traduite d'après la quatrième édition anglaise et enrichie de nombreuses additions par J. FITZ-PATRICK. Paris, A. Hermann, 1907. 8vo. 3 parts. 5 francs each.

THE subject of mathematical recreations has always occupied a prominent position in the history of science. Zeno, Alcuin, Bachet, Fermat, Lucas, — these are only a few of the hundreds of names that might be mentioned of those who have contributed to this interesting field. Many of these men have been mathematicians of no small repute, for in reality the border line between recreative and serious mathematics is purely imaginary. To the mathematician all mathematics is a recreation; it is to

him what color is to Sorolla or form to Michelangelo or rhythm to a reader of Poe, and the teacher is a poor one who does not appreciate this fact. It is because mathematics is itself a subject full of interesting situations, of wonder, and of rhythm that more students enjoy it than some of our pedagogical agitators think, and it is because of this that much of the effort to humanize mathematics to-day is really, though well meant, an effort to make it less human.

It is partly for those mistaken teachers who feel that mathematics has not the same interest per se that music or art or literature has, that Mr. Ball prepared this interesting collection upwards of seventeen years ago. But it was also for the mathematician himself, who abuses his nerve system in his love for the more serious side of the science, that the book was written, even as Punch is published not merely for the casual reader but also for the statesman who needs to see his labors in a different light after a night in parliament.

The English work has now passed through four editions and the French translation through two, which testifies anew to the pleasant style and to the wisdom of selection that characterizes Mr. Ball's various publications.

The French edition is considerably more extended than the English original in some respects, filling three volumes. The chief departure from the original is in Chapter I, Some arithmetical questions. This occupied less than forty pages in the English edition, but it makes up the first volume, of over three hundred pages, in the translation. The added material relates largely to the history of numbers and to interesting problems of early and medieval times. The mysticism of numbers, so exhaustively treated from the religious side by Bungus three centuries ago, speculations on the platonic number, curious properties of decimal numbers, the application of algebra to number games, and the elementary theory of numbers in general are some of the features of the French edition that make it well worth placing upon the shelves of any mathematical or general library.

DAVID EUGENE SMITH.

Lehrbuch der Kristalloptik. Von F. POCKELS. Teubners Sammlung XIX. Leipzig, B. G. Teubner, 1906. x + 520 pp.

ALTHOUGH the past five years have seen the publication of a large number of books on optics, the subject is so broad and