SHORTER NOTICES.

Elementary Calculus.   By Percy F. Smith, Ph.D.   New
York, American Book Company, 1902, 1903.   8vo, 99 pp.

THE appearance of a new text book on elementary calculus
is not a rare occurrence, but the first satisfactory answer to a
definite question is always worthy of notice.   In many tech-
nical schools students not in engineering courses are given an
elementary course on the calculus, consisting of from thirty-
five to fifty exercises.   To make any "short course" success-
ful is at best a difficult problem, and almost impossible of so-
lution without a special text-book which can be completed in
the alloted time.   Otherwise the subject must be presented by
lectures or by extracts from a larger text.   Now a first or
second year student wants the book, the whole book, and noth-
ing but the book.   Lectures on points not covered by the text
are almost sure to be received with indifference, while whatever
is in the book is accepted without question.   If the course is
given from a larger text the average student would be able to
prove special theorems, solve problems, if he could guess under
what case they occur, but would very probably lack any gen-
eral idea of the subject.

In preparing a book to fill this want Professor Smith has
written a true introduction to the fundamental ideas of the
calculus.   In case a rigorous proof would be beyond the scope
of the book it is made clear that the explanation given is to
illustrate the meaning of the theorem.

To the original five chapters of the book there has been
added in the new edition another chapter of examples.   The
examples throughout are very well chosen, and the derivation
of the derivatives and integrals of the elementary functions
clearly given.   The main interest centers in the introduction
of the fundamental notions of the calculus — function, limiting
value of a function, continuity, derivative and integral.   In
the definition of function and the exercises following, the idea
is brought out that a function may be defined by an analytic
law for some values of the independent variable and not for all ;
this point is usually omitted in elementary text books, and the
omission is sadly felt when indeterminate forms are taken up.

After considering the graphs of some elementary functions, the idea of limit and limiting value of a function is introduced and a continuous function defined by the relation, limit $f(x) = f$ (limit x). In the theorems on limits, in preparation for derivative, the limit of $\dfrac{\sin \theta}{\theta}$ and of the series for e are taken up. No rigorous consideration of the limit of $\left[1 + \dfrac{1}{z} \right]^z$ is given, but the quantity is calculated for ten values of z and the graph constructed as illustration of the fact that the limit is the previously defined quantity e. Exercises follow on the limiting values of some elementary functions.

Chapter II. gives a clear conception of derivative, the general definition being given after the consideration by text and examples of increment and increment quotient, and the special cases of velocity and slope of the tangent of a curve. General rules, the derivatives of the elementary functions and numerous examples follow.

Chapter III. takes up tangent and normal, maxima and minima, expansion of functions and differentials. Maxima and minima are treated very clearly. The theorem of the mean is stated, the proof being geometric. As a more general law of the same nature Taylor's expansion with remainder is given, but without proof. Differential of $f(x)$ is defined as the first term in the expansion of $f(x + \varDelta x) - f(x)$. In the exercises the meaning of differential and infinitesimal of higher order is brought out by examples of area and volume.

Chapter IV. takes up the definition of integral, integrals of the elementary forms, definite integrals and limit of a sum. Chapter V. is devoted to functions of two or more variables, partial derivative, total differential and total derivative.

The press work on the book is good and the page — very different from the average English text — looks interesting. The book should meet with success, for by its aid the " short course " may become really worth while.　　　MAX MASON.

Geometrische Transformationen. I Teil: Die projektiven Transformationen nebst ihren Anwendungen. Von DR. KARL DOEHLEMANN. Leipzig, Göschen, 1902. vii + 322 pp.

THE theory of transformations has come to be of fundamental importance in geometry and yet the number of books devoted