of Chapter II. Of course, most of the errors would be easily detected, even by the casual reader, but when the text is made to speak of the discriminant of the realm as "le plus grand diviseur des nombres entiers du corps" (page 26), the beginner may have some trouble in supplying the omission. The same thing is true of the omission of the word "premier" in the statement of the theorem on page 65. In many places, as on page 49, where several equations are printed in one line without commas between, the right member of one and the left member of the following one appear as a product. Again, on page 65 where examples are given to illustrate the use of the symbol $(\frac{d}{p})$ to determine in what way the principal ideal (p) can be broken up into ideal factors, we find the word "Corps" in a line by itself followed in the next line by

$$k(\sqrt{-5}) \quad m = -5 \quad d = -20$$

without any punctuation whatever, just as though m and d were necessary to define the realm.

The book would have been greatly improved for the general reader by printing the theorems in italics instead of in Roman characters.

The reader who glances over the table of contents and finds the entry "Index" will wonder if Frenchmen are reforming in the matter of indexes. But his surprise will be quickly turned to disappointment when he finds that the word is only a translation of Sommer's "Literatur-Verzeichnis" referring to the list of tables relating to the theory of numbers.

E. B. SKINNER.

An Introduction to the Infinitesimal Calculus—Notes for the use of Science and Engineering Students. By H. S. CARSLAW, Professor of Mathematics in the University of Sidney. Second edition, 1912. Longmans, Green and Co. xvi + 137 pp.

As indicated in the subtitle and in the preface, this little book is intended for first year students in the engineering schools of universities and technical colleges. It presumes a preparatory knowledge of trigonometry and elementary algebra, only. The first edition (1905, x + 103 pages) demanded a knowledge of infinite series for the deduction of the formulas for differentiating e^x and $\log x$; in the present edition new methods are used in the text and the old proofs are placed in an appendix. Other changes are the addition of a section on repeated differentiation, one on fluid pressure, and a number of new exercises.

In Chapter I (16 pages) the rectangular coordinate geometry of the straight line is presented; in Chapter II (14 pages) the meaning of differentiation; in Chapter III (14 pages) the differentiation of algebraic functions and some general theorems; in Chapter IV (16 pages) the differentiation of the trigonometric and inverse trigonometric functions; in Chapter V (20 pages) the differentiation of the logarithmic and exponential functions, maxima and minima, partial derivatives; Chapter VI (10 pages), the conic sections; Chapter VII (15 pages), integration; Chapter VIII (22 pages), the definite integral and its applications.

This book is an example of a brief text which has not sacrificed accuracy of definition of the terms used, and should be, for the most part, legible to a first year student without the constant assistance of a preceptor; this will hardly be the case however when he encounters the term "rectangular hyperbola" (page 18), or "parabola" (page 19), or when he is expected to remember (page 45) that

$$\lim_{\theta=0} (\sin \theta)/\theta = 1.$$

First year students are not too young to be emphatically impressed with the notion that whenever an indicated operation seems to demand dividing by zero, no such demand is really made, but a special investigation is required. Thus, after proving (pages 4–5) that for every prescribed real number m, the equation $y = mx$ represents a straight line through the origin, it would seem better to omit the statement, "if $m = \infty$, the line is the axis of y," and state the converse: Every line through the origin, *except the axis of* y, can be represented by an equation of this form. Similar remarks apply to the solution (page 10)

$$\frac{x}{bc' - b'c} = \frac{y}{ca' - c'a} = \frac{1}{ab' - a'b}$$

of the equations

$$ax + by + c = 0, \quad a'x + b'y + c' = 0,$$

and to the formula (page 37)

$$\frac{dy}{dx} \cdot \frac{dx}{dy} = 1.$$

The notion of a limit set forth on page 21 is carefully worded and sufficient for the purpose immediately in view, and the use of the notation

$$\underset{x \to a}{Lt}(y) = b \quad \text{instead of} \quad \underset{x = a}{Lt}(y) = b$$

makes for clearness with a beginning student, but it would be unfortunate to leave him with the impression that a function never attains its limit. Continuity is not mentioned except incidentally in § 13, page 19. Little emphasis is put on the existence of a limit; in finding the derivative of $y = x^{p/q}$ (page 39) and of $y = \sin^{-1} x$ (page 52) the question of existence, which would be unlikely to arise in the mind of the reader, is not raised by the author.

Considerable interest attaches to the use in Chapter V of 7, 8, and 15 place logarithm tables to make it seem plausible to the reader (the author states in advance that the discussion is not a rigorous proof) that $\lim\limits_{n=\infty} (1 + 1/n)^n$ exists, that $e = 2.718$ (approximately) and that $\lim\limits_{n=\infty} n \log_{10} (1 + 1/n)^n$ exists and $= .4343$ (approximately). From these results

$$\frac{d}{dx} \log_{10} x = \frac{\log_{10} e}{x} \quad \text{and} \quad \frac{d}{dx} \log_e x = \frac{1}{x}$$

are deduced; then $de^x/dx = e^x$, considering e^x as the inverse of $\log_e x$.

If one decides not to go into a detailed proof to establish these formulas, it is of course a matter of opinion what would better be assumed and what proved. An alternative and equally plausible assumption, after e^x has been defined, is that

$$1 + x < e^x < \frac{1}{1 - x} \quad \text{for} \quad -1 < x < 1,$$

from which follow

$$\frac{d}{dx} e^x = e^x \quad \text{and} \quad \left(\frac{d}{dx} \log_e x\right)_{x>0} = \frac{1}{x},$$

considering $\log_e x$ as the inverse of e^x.

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