AN ELEMENTARY TREATISE ON THE DIFFERENTIAL AND INTEGRAL CALCULUS, WITH EXAMPLES AND APPLICATIONS

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An Elementary Treatise on the Differential and Integral Calculus, with Examples and Applications by George A. Osborne

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PREFACE.

This work, intended as a text-book for colleges and scientific schools, is based on the method of limits, as the most rigorous and most intelligible form of presenting the first principles of the subject. The method of limits has also the important advantage of being a familiar method; for it is now so generally introduced in the study of the more elementary branches of mathematics, that the student may be assumed to be fully conversant with it on beginning the Differential Calculus.

The rules or formulæ for differentiation in Chapter III. differ in one respect from those in similar text-books, in being expressed in terms of u instead of x, u being any function of x. They are thus directly applicable to all expressions, without the aid of the usual theorem concerning a function of a function.

After acquiring the processes of differentiation, the student in Chapter V. is introduced to the differential notation, as a convenient abbreviation of the corresponding expressions by differential coefficients. This notation has manifest advantages in the study of the Integral Calculus and in its applications.

In Chapter IX. and subsequent pages I have introduced for Partial Differentiation the notation $\frac{\partial}{\partial x}$, which has recently come into such general use.

The chapters on Maxima and Minima have been placed after the applications to curves, as the consideration of that subject is much simplified by representing the function by the ordinate of a curve. Maxima and Minima may be taken, if desired, with equal advantage immediately after Chapter XIII.

In Chapter X., Integral Calculus, I have taken the problem of finding the Moment of Inertia of a plane area, as a better illustration of double integration than that of finding the area itself. The student more readily comprehends the independent variation of x and y in the double integral,

$$\int\int (x^2 + y^2)\,dx\,dy, \quad \text{than in} \quad \int\int dx\,dy.$$

A few pages of Chapter XII., Integral Calculus, are devoted to a description of the Hyperbolic Functions together with their differentials, and a comparison is made with the corresponding Circular Functions.

G. A. OSBORNE.

BOSTON, 1895.

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