Fluxions Encyclopedia Article

Fluxions

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Contents

Fluxions Encyclopedia Article.....1

Contents.....2

Fluxions.....3

Fluxions

In 1665 **Isaac Newton**, an English mathematician, introduced the concept of a fluxion. Fluxion was the early term for what we now call a derivative, which is just the instantaneous rate of change of a function with respect to a **variable**.

While Newton was at Cambridge the university was closed because of the plague of 1665. During this time Newton commenced his studies to revolutionize mathematics, optics, physics and astronomy. He laid the foundations for differential and integral **calculus** several years before its independent discovery by Leibniz. It was during this time that he created his method of fluxions that was based on his important insight that the integral of a function is simply the result of the inverse procedure applied to a derivative. Newton visualized a curve as an entity being traced by a particle moving according to two moving lines that were the coordinates. The velocity of the particle was defined as the derivative of the *x*-line and the derivative of the *y*-line. These derivatives were the fluxions of *x* and *y* coordinates connected with the flux of time. *x* and *y* were the flowing quantities themselves. Using the fluxion notation that he developed he described the tangent to the function $f(x,y) = 0$ as y'/x', where y' and x' are the derivatives. Using the fluxion he developed simple analytical methods that unified the separate techniques employed to find areas, tangents, the lengths of curves and the maxima and minima of **functions**. Newton considered integration a process by which fluents, or functions in modern terms, were determined for a given fluxion, or derivative in modern terms. His method implied that integration and differentiation were inverse procedures. Newton wrote *Method of fluxions and infinite series* detailing the development of his methods in 1671. The book was eventually published in English in 1736. It was later, after G. W. Leibniz independently developed his methods of differential and **integral calculus**, that Newton's notations and terms of fluxions were discarded and replaced by Leibniz's terms of **derivatives and differentials**.