Integral Calculator

The great French mathematician and philosopher Blaise Pascal (B. Pascal, 1623-1662) made a great contribution to integral calculus. In studying the cycloid, Pascal proposed general methods for determining the lengths and centers of gravity of various curves. In his Treatise on the Sinus of the Quarter Circle, he calculated integrals from trigonometric functions and introduced elliptical integrals, which later played a significant role in integral calculus and its applications. Pascal proved a number of theorems concerning integration in parts and replacement of the variable.

The relationship between integration and differentiation as reciprocal operations in geometric form was first shown by Isaac Barrow (J. Barrow, 1630-1677) in his main work "Optical and Geometric Lectures" (1669-1670). Barrow obtained formulas that are still used today to calculate the lengths of curve arcs given in Cartesian and polar coordinates.

Integral Calculator Online

A common method of differentiation and integration, with a deep understanding that one process is inverse to another, was created by Newton and Leibniz independently.

Isaac Newton (J. Newton, 1643-1727) presented his calculation in Fluxy Method in 1670-1671 a few years earlier than Leibniz, but it was only published after Newton's death in 1736. In the "Fluxy method" Newton clearly formulated in mathematical and mechanical terms both reciprocal analysis problems, developed and applied the method of fluxy to a large number of geometric problems (problems about tangents, curvature, extrema, quadrature, straightening, etc.). In the same work a number of integrals are presented in elementary functions, some types of ordinary differential equations and some problems of variation calculus are solved.

Newton's colossal work "Mathematical Beginnings of Natural Philosophy" (1687), created over 20 years, showed all the power of differential and integral calculus in the study of nature and Newton's ability to apply them.

Gottfried Wilhelm Leibniz (G.W. Leibniz, 1646-1716) using a geometric approach and developing the ideas of Pascal and Barrow, creates his own differential and integral calculus (these names belong to Leibniz). In 1684 he published in the mathematical journal Acta Eruditorum, founded by him, the article "A new method for maximums and minimums and for tangents, for which fractional and irrational quantities are not an obstacle, and a special kind of computation for this", and in 1686 he published the article "On hidden geometry ..." with the rules of integration and the familiar symbol of the integral.

Further development of differential and integral calculus is connected with the names of many outstanding scientists: brothers Bernoulli - Jacob (J. Bernoulli, 1654-1705) and Johann (J. Bernoulli, 1667-1748) and first of all Leonard Euler (L. Euler, 1707-1783). Euler's treatise "Differential Calculation" (1755, Berlin) and three-volume "Integral Calculation" (1768-1770, St. Petersburg) contain a sequential presentation of differential and integral calculus in a form known to us, the theory of differential equations, Taylor's theorem with many applications, Euler's summation formula and Euler's integrals (B- and Γ-functions).

Integral Calculator with steps

Outstanding contributions to the development of integral calculus methods were made by Adrien Marie Legendre (A.-M. Legendre, 1752-1833) "Exercises on integral calculus" in three volumes (1811-1819) and "Treatise on elliptical functions and Euleric integrals" (1827-1832), and by Niels Henrik Abel (N.H. Henrik Abel). Abel (1802-1829), Carl Gustav Jacobi (K.G.J. Jacobi, 1804-1851), Mikhail Vasilyevich Ostrogradsky (1801-1862), Pafnuty Lvovich Chebyshev (1821-1894), George Friedrich Bernhard Riemann (G. Bernhard Riemann), and others. F.B. Riemann (1826-1866), Henri Louis Lebesgue (1875-1941), Oscar Perron (b. 1880), Arno Danjoy (1884-1974), Alexander Yakovlevich Hinchin (1894-1959) and other scientists.