I'm not robot
reCAPTCHA
Continue

Differential calculus pdf file

The field of mathematics; The lower area of the calculus is a graphic of a function drawn in black and a tangent line to this function drawn in red. The slope of the tangent line is equal to the derivative of the function at the marked point. Calculus Basic theorem Leibniz integral rule Limits of Functions Average value theorem Differential Definitions Derivative (generalizations) A function total Concepts Differentiation representation Second derivative Implicit differential Logarith differential is part of a series of articles about infinite simal Mical differentiation Related ratio Sum of Taylor's theorem Rules and identities Product Chain Power Coefficient L'Hôpital rule Reverse General Leibniz Faà di Bruno's formula Integral Lists integral transform Definitions Antiturevit Integral (inappropriate) Riemann integral Lebesgue integration Contour Integrated Reverse functions Integration with Part Discs Cylindrical shells Subseging (trigonometric, Weierstrass, Euler) Euler formula Partial fractions Replacement sequence Reduction formula Integral Under Distinguished Series Geometric (arithmeico-geometric) Harmonic Alternative Power Binomial Stone Convergence Tests Total and limit (period test) Ratio Root Integral Direct comparison Limit comparison Alternative series Cauchy condensation Dirichlet Abel AndCtor Gradient Divergence Curl Laplacian Directional derivative IDs Theorems Gradient Green's Stokes's Divergence generic Stokes Multi-Variableformalisms Matrix Tensor External Geometric Definitions Partial derivative Multi integral Line integral Surface integral Volume integralJacobian Hessian Custom Fraction malliavin Stochastic Variations Calculus Dictionary Account Subjects Dictionary Vte In Mathematics, differential calculus is a calculus sub-field that examines the rates at which quantities change. [1] It is one of two sections of two traditional calculus, the integral calculus of the other, which is the study of the area below one curve. [2] The primary objects of differential calculus work are derivatives of a function, related concepts such as differentials and their applications. The derivative of a function in the selected input value explains the rate at which the function close to that input value changes. The process of finding a derivative is called differentiation. Geometrically, at some point, the pattern is the slope of the tangent line to the graph of the function at that point, but if the derivative exists and is considered defined at that point. For the actual value function of a single real variable, the derivative of a function at a point typically determines the best linear approximate value to the function at that point. Differential calculus and integral calculus are connected by calculus theorem, which means that differential is a reverse process to integration. Differentiation has practices in almost all quantitative disciplines. Physics displacement of an object that moves according to time is the speed of the cinin and the derivative acceleration of speed by time. The derivative of a cale's momentum over time is equal to the force applied to the body; the reorganization of this derivative statement led to the famous F = ma equation associated with Newton's second law of motion. The reaction rate of the chemical reaction is a derivative. In operational research, derivatives determine the most efficient ways to transport materials and design factories. Derivatives are often used to find maxima and minima of a function. Equations containing derivatives are called differential equations and are fundamental to the identification of natural phenomena. Its derivatives and generalizations occur in many areas of mathematics such as complex analysis, functional analysis, differential geometry, measurement theory and abstract algebra. The graph of a derivative Random function is y = f (x) {\displaystyle y=f(x)} . The orange line x = a {\displaystyle x=a} tangent means exactly what it means at this point, the slope of the curve, and the straight line are the same. At different points, the derivative f (x) {displaystyle f(x)} is defined as the slope of the tangent at x = a {\displaystyle x=a} (a , f (a)) {\displaystyle (a,f(a))} . [3] To gain an intuition for this definition, you must first be informed about finding the slope of a linear equation written as y = m x x + b {\displaystyle y=mx+b}. The slope of an equation is its steepness. Splitting any two points by selecting and changing the change in y {\displaystyle y} to x {\displaystyle x}, i.e. x {\displaystyle {\text{slope }}=\frac {{\text{ change in }}y}{{{\text{change in }}}}} (Example, y = − 2 x + 13 {\displaystyle y=-2x+13} graphic − 2 {\displaystyle -2} (as shown in the following diagram: y − − − 2 x − 13 {\displaystyle y=-2x-13} graphic x = − 6 + 3 = − 2 {\displaystyle {\frac {{\text{change in }}y}{{\text{change in }}x}}={\frac {-6}{ For abbreviation 3}}=-2} For abbreviation, a y-change in x {\frac {{\text{change in }}y}{\text{change in }}x}}} is usually written as Δ y Δ x {\displaystyle {\frac {\Delta y}{\Delta x}}}, Δ {\displaystyle \Delta } means 'change in'. The slope of a linear equation is constant, meaning that the steepness is the same everywhere. However, many charts, such as y = x 2 {\displaystyle y=x^{2}} , differ in their steepness. This means no longer taking any two random points and calculating the slope. Instead, the slope of the chart is defined using a tangent line and a line that 'touches only' a specific point. The slope of the curve at a specific point is defined as the slope of the tangent to that point. For example, y = x 2 {\displaystyle y=x^{2}} In x = 2, the 4 {\displaystyle 4} slope is equal to 4 {\displaystyle 4} (2 screen styles 4} : Y = x 2 {\displaystyle y=x^{2}} graphic with a tangent straight line (2 , 4) {\displaystyle (2.4)} . The slope of the tangent line is equal to 4 {\displaystyle 4}. (Note that the chart's axes do not use a scale of 1:1.) The derivative of a function is defined as the slope of this tangent line. [Note 1] Even if the tangent line touches only one point, it can be estimated approximately with a line that crosses two points. This is known as a secant line. If the two points where the secant line passes are close to each other, The secant line is very similar to the tangent line, and as a result its slope is very similar: The dotted line passes through points (2 , 4) {\displaystyle (2.4)} and (3 , 9) {\displaystyle (3.9)} is located on the curve y = x 2 {displaystyle y=x {2}^}. Since these two points are quite close to each other, the dotted line and tangent line have a similar slope. As the two dots get closer together, the error generated by the sequence line becomes increasingly small. The advantage of using a secant line is that its slope can be calculated directly. The two points in the chart (x , f (x) { \displaystyle (x,f(x))} and (x + Δ x , f (x + Δ x) {\displaystyle (x+\Delta x,f(x+\Delta x))} , Δ x {\displaystyle \Delta x} is a small number. As before, the slope of this two-point line can be calculated with formula bevel = Δ y Δ x {\displaystyle {\text{slope }}=\frac {\Delta y}{\Delta x}}}. This slope = f (x + Δ x) − f (x) Δ x {\displaystyle {\text{slope}}={\frac {f(x+\Delta x)-f(x)}{\Delta x}}} Δ x {\displaystyle \Delta x} 0 {\displaystyle 0} approaches, the slope of the secant line gets closer and closer to the slope of the tangent line. This is officially lim Δ x → 0 f (x) Δ x) Δ x {\displaystyle \lim _{\Delta x\to 0}{\frac {f(x+\Delta x)-f(x)}{\Delta x}} As the above expression 'x {\displaystyle x} approaches and approaches 0, the slope of the line of sns gets closer to a certain value. The approached value is f (x) {\displaystyle f(x)}; this can be written as f' (x) {\displaystyle f'(x)}. If y = f (x) is {\displaystyle y=f(x)}, the derivative can also be written as d y d x {\displaystyle {\frac {dy}{dx}}}, d {\displaystyle d} represents an infinite change. For example, d x {\displaystyle dx} x.[Note 2] Represents an infinitesial change in the abstract, if y = f (x) {\displaystyle y=f(x)} is f (x) {\displaystyle f(x)} d y d x = f ′ (x) = lim Δ x → 0 f (x + Δ x) − f (x) Δ x {{x) \displaystyle {\frac {dy}{dx}}=f'(x)=\lim _{\Delta x\to 0}{\frac {f(x+\Delta x)-f(x)}\Delta x}}} if such a limit exists. [4] [Note 3] Distinguish using a function the above definition is known as differentiation from the first principles. Here's evidence that uses differentiation from the first principles. y = x 2 {\displaystyle y=x^{2}} 2 x {\displaystyle 2x} olduğunu: d y d x = lim Δ x → 0 f (x + Δ x) − f (x) Δ x = lim Δ x → 0 (x + Δ x) 2 − x 2 Δ x = lim Δ x → 0 x 2 + 2 x Δ x + (Δ x) 2 − x 2 Δ x = lim Δ x → 0 2 x Δ x + (Δ x) δ x x → 0 2 x Δ x {\displaystyle {\begin{aligned}{\frac {dy}{dx}}&amp=\lim _{\Delta x\to 0}\frac {f(x+\Delta x)-f(x)}\Delta x}\\&\\\