

Calculus 1

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1 Derivatives

1.1 Derivative as a concept

The derivative of a line describes the rate of change of the vertical component with respect to the horizontal component. The derivative will allow us to calculate not the slope, but the instantaneous rate of change at a given point. The derivative will give us the rate of change at a given point that will be give us the slope of the tangent line at that point. The reverse is true aswell.

1.2 Calculating the derivative

Considering that the Δy bewteen two points is the result of substracting the y component defined as $f(x)$ from the y component of a second point that can be written as $f(x + \Delta x)$, can be defined Δy as $f(x + \Delta x) - f(x)$. Thus, formula to find the derivative of a function $f(x)$ is

$$\frac{\Delta y}{\Delta x} = \frac{f(x + \Delta x) - f(x)}{\Delta x}$$

Assuming a function $f(x) = x^2$ we can calculate the derivative as follows

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$$\frac{f(x + \Delta x) - f(x)}{\Delta x}$$