Elementary Calculus Manual

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Contents

Differential calculus with one variable

Increment

Definition (Increment of a variable)

An *increment* of a variable x is a change in the value of the variable and is denoted Δx. The increment of a variable x along an interval $[a, b]$ is

$$\Delta x = b - a.$$

Definition (Increment of a function)

The *increment* of a function $y = f(x)$ along an interval $[a, b] \subseteq Dom(f)$ is

$$\Delta y = f(b) - f(a).$$

Example The increment of x along the interval $[2, 5]$ is $\Delta x = 5 - 2 = 3$ and the increment of the function $y = x^2$ along the same interval is $\Delta y = 5^2 - 2^2 = 21$.

Average rate of change

The study of a function $y = f(x)$ requires to anderstand how the function changes, that is, how changes the dependent variable y when we change the independent variable x.

Definition (Average rate of change)

The *a*verage rate of change of a function f in an interval $[a, a + \Delta x] \subseteq Dom(f)$, is the quotient between the increment of $y = f(x)$ and the increment of x in that interval, and is denoted

$$\text{ARC } f[a, a + \Delta x] = \frac{\Delta y}{\Delta x} = \frac{f(a + \Delta x) - f(a)}{\Delta x}.$$