

Definition of differentials

Suppose $y = f(x)$ is a differentiable function. The differential dy is defined by

$$dy = f'(x) dx,$$

where the differential dx is simply an independent variable representing a nonzero real number.

Approximation by differentials

Suppose $y = f(x)$ is a differentiable function. For small Δx ,

$$\Delta y = f(x + \Delta x) - f(x) \approx f'(x) \Delta x.$$