

Antidifferentiation

If $F'(x) = f(x)$, then $\int f(x) \cdot dx = F(x) + c$

$$\int x^n \cdot dx = \frac{x^{n+1}}{n+1} + c, \quad n \in \mathbb{N} \cup \{0\}$$

Rules:

$$\int [f(x) \pm g(x)] \cdot dx = \int f(x) \cdot dx \pm \int g(x) \cdot dx$$

$$\int k f(x) \cdot dx = k \int f(x) \cdot dx, \text{ where } k \in \mathbb{R}$$

Applications of differentiation to kinematics

Kinematics - straight line motion of a particle

Instantaneous velocity - dx/dt

Newton's method

$$x_{n+1} = x_n - \frac{f(x_n)}{f'(x_n)}$$

or

$$x_1 = x_0 - \frac{f(x_0)}{f'(x_0)}$$