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The Basics of Integration

Basic Rules in Integration

Power Rule: For any function $f(x) = x^n$, the integral is:

$$\int x^n \, dx = \frac{x^{n+1}}{n+1} + C \quad (n \neq -1)$$

Example: $\int x^2 \, dx = \frac{x^3}{3} + C.$

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Basic Rules in Integration

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Sum Rule: The integral of a sum of functions is the sum of their integrals:

$$\int [f(x) + g(x)]\,dx = \int f(x)\,dx + \int g(x)\,dx$$

Example: $\int (x^2 + 2x)\,dx = \frac{x^3}{3} + x^2 + C.$

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Basic Rules in Integration

Basic Rules in Integration

Constant Rule: The integral of a constant times a function is the constant times the integral of the function:

$$\int c \cdot f(x)\,dx = c \int f(x)\,dx$$

Example: $\int 3x^2\,dx = 3 \cdot \frac{x^3}{3} = x^3.$

Basic Rules in Integration

Basic Rules in Integration

Definite Integral: The integral between two bounds ‘a’ and ‘b’ is:

$$\int_a^b f(x)\,dx = F(b) - F(a)$$

Where $F(x)$ is the antiderivative of $f(x)$.