# Integration Rules Cheat Sheet

Complete integration rules cheat sheet with all antiderivative formulas, substitution, integration by parts, and trigonometric integrals. Free PDF download.

## Basic Integration Rules

### Constant

$$\int k\,dx = kx + C$$

### Power Rule

$$\int x^n\,dx = \frac{x^{n+1}}{n+1} + C$$

*Valid for n ≠ -1. Add 1 to exponent, divide by new exponent*

### Sum Rule

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

### Constant Multiple

$$\int kf(x)\,dx = k\int f(x)\,dx$$

## Common Integrals

### 1/x

$$\int \frac{1}{x}\,dx = \ln|x| + C$$

### Exponential

$$\int e^x\,dx = e^x + C$$

### General Exponential

$$\int a^x\,dx = \frac{a^x}{\ln(a)} + C$$

## Trigonometric Integrals

### Sine

$$\int \sin(x)\,dx = -\cos(x) + C$$

### Cosine

$$\int \cos(x)\,dx = \sin(x) + C$$

### Secant Squared

$$\int \sec^2(x)\,dx = \tan(x) + C$$

### Cosecant Squared

$$\int \csc^2(x)\,dx = -\cot(x) + C$$

### Secant Tangent

$$\int \sec(x)\tan(x)\,dx = \sec(x) + C$$

### Cosecant Cotangent

$$\int \csc(x)\cot(x)\,dx = -\csc(x) + C$$

### Tangent

$$\int \tan(x)\,dx = -\ln|\cos(x)| + C$$

### Secant

$$\int \sec(x)\,dx = \ln|\sec(x) + \tan(x)| + C$$

## Inverse Trig Integrals

### Arcsine Form

$$\int \frac{1}{\sqrt{a^2 - x^2}}\,dx = \arcsin\left(\frac{x}{a}\right) + C$$

### Arctangent Form

$$\int \frac{1}{a^2 + x^2}\,dx = \frac{1}{a}\arctan\left(\frac{x}{a}\right) + C$$

## Integration Techniques

### U-Substitution

$$\int f(g(x))g'(x)\,dx = \int f(u)\,du$$

*Let u = g(x), then du = g'(x)dx*

### Integration by Parts

$$\int u\,dv = uv - \int v\,du$$

*Choose u and dv wisely (LIATE rule)*

## Definite Integrals

### Fundamental Theorem

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

*Where F'(x) = f(x)*

### Area Between Curves

$$A = \int_a^b (f(x) - g(x))\,dx$$

*Top minus bottom*