

Various Examples

How to Choose the Right Method for Integration?

Ibraheem Alolyan

King Saud University

How to Choose the Right Method for Integration

1 Integration Table

2 Methods of Integration

- Integration by Substitution
- Integration By Parts
- Trigonometric Integrals
- Trigonometric Substitutions
- Partial Fraction Decomposition
- Integrals Involving Quadratic Forms
- Miscellaneous Substitution
 - Integrals Involving Fractional Powers $x^{\frac{1}{n}}$
 - Integrals of the Form $\sqrt[n]{f(x)}$
 - Fractional Functions in $\sin x$ and $\cos x$

Integration Table

Methods of Integration

Examples

Example

$$\int \frac{(2^x)^2}{\sqrt{2^{2x+2} + 1}} dx$$

Examples

Example

$$\int \frac{\ln x}{\sqrt{x}} dx$$

Examples

Example

$$\int x \tan^2 x \, dx$$

Examples

Example

$$\int \frac{(x^2 - \sin x) \cdot 2x^3 + 3 \cdot \cos x}{22x^3 + 6 \cos x + 5} dx$$

Examples

Example

$$\int \frac{dx}{x\sqrt{x^6 - 3}}$$

Examples

Example

$$\int \frac{\cot x \cdot dx}{\sqrt{9 - (\sin x)^4}}$$

Examples

Example

$$\int \frac{dx}{x^3 \sqrt{x^2 - 4}}$$

Examples

Example

$$\int \frac{4x^2 + 4x + 5}{(x + 1)(x^2 + 4)} dx$$

Examples

Example

$$\int (\cos x)^5 (\sin x)^6 dx$$

Examples

Example

$$\int \frac{dx}{4 + 3 \cos x - \sin x}$$

Examples

Example

$$\int \frac{dx}{(x^2 - 2x + 2)(x - 1)}$$

Examples

Example

$$\int \frac{1}{\sqrt{x^2 + 4x + 3}} dx$$

Examples

Example

$$\int \frac{dx}{x\sqrt{9-x^{10}}} dx$$

Examples

Example

$$\int \frac{x^4}{\sqrt{3x^5 - 1}} dx$$

Examples

Example

$$\int \frac{x^2}{\sqrt{25 - x^2}} dx$$

Examples

Example

$$\int x^3 (1 - x^2)^{\frac{5}{2}} dx$$

Examples

Example

$$\int x\sqrt{1-x^4} \, dx$$

Examples

Example

$$\int \frac{1}{(x^2 + 1)^2} dx$$

Examples

Example

$$\int (e^{2x} + 2)^2 dx \quad (x > 0)$$

Examples

Example

$$\int \frac{\sqrt{x^3}}{1+x^5} dx$$

Examples

Example

$$\int \frac{1 - 2x^4}{x\sqrt{1 - x^4}} dx$$

Examples

Example

$$\int \frac{x}{(x^2 + 1) \cos^2 (\ln (x^2 + 1))} dx$$

Examples

Example

$$\int \frac{\sinh x}{\sqrt{2\cosh x - 4}} dx$$

Examples

Example

$$\int (x^5 + 1) \ln x dx$$

Examples

Example

$$\int \frac{\cos(2x)}{\sec(5x)} dx$$

Examples

Example

$$\int \frac{3x + 1}{(4 + x^2)^{\frac{3}{2}}} dx$$

Examples

Example

$$\int \frac{x^2}{x^2 - x - 2} dx$$

Examples

Example

$$\int \frac{2x - 1}{x^2 + 2x + 2} dx$$

Examples

Example

$$\int \frac{dx}{\sqrt{x}\sqrt{4-x}} \quad (0 < x < 4)$$

Examples

Example

$$\int \frac{dx}{x\sqrt{x^6 - 16}} \quad (x > \sqrt[3]{4})$$

Examples

Example

$$\int (\tan x)^4 (\sec x)^4 dx$$

Examples

Example

$$\int \frac{dx}{x \ln x \sqrt{(\ln x)^4 - 1}}, (x > e)$$

Examples

Example

$$\int \left(1 + \frac{1}{x}\right) \ln x dx$$

Examples

Example

$$\int \frac{\sqrt{x}}{(1 + x\sqrt{x})^5} dx$$

Examples

Example

$$\int \frac{e^x(x+1)}{\sqrt{9+4x^2}e^{2x}}dx$$

Examples

Example

$$\int \frac{1}{\sqrt{e^{4x} - 16}} dx$$

Examples

Example

$$\int \frac{8x + 32}{(x - 2)(x^2 - 4)} dx$$

Examples

Example

$$\int \frac{x-3}{x\sqrt{x^2-25}} dx$$

Examples

Example

$$\int \frac{9x^2 - 20x + 10}{x^3 - 3x^2 + 2x} dx$$

Examples

Example

$$\int \frac{dx}{\sqrt{x^2 + 2x + 5}}$$

Examples

Example

$$\int \frac{1}{x\sqrt{1-x^5}} dx$$

Examples

Example

$$\int \frac{dx}{x^{\frac{1}{4}} + x^{\frac{1}{2}}}$$

Examples

Example

$$\int \frac{2^x dx}{\sqrt{4 - 4^x}}$$

Examples

Example

$$\int x^3 \sqrt{x^2 - 4} dx$$

Examples

Example

$$\int \frac{x + \sin^{-1} x}{\sqrt{1 - x^2}} dx$$

Examples

Example

$$\int \frac{dx}{\sqrt{4 - e^x}}$$

Examples

Example

$$\int \frac{dx}{\sqrt{x}(2+x)}$$

Examples

Example

$$\int \frac{\sin(x)}{\sqrt{e^{\cos(x)} - 1}} dx$$

Examples

Example

$$\int \frac{dx}{2 + \cos x}$$

Examples

Example

$$\int \frac{dx}{(x+1)^{\frac{5}{6}} - (x+1)^{\frac{1}{2}}}$$

Examples

Example

$$\int \frac{x^2 + 1}{\sqrt{9 - x^2}} dx$$

Examples

Example

$$\int \frac{dx}{\sqrt{4x - x^2}}$$

Examples

Example

$$\int x^{\frac{1}{4}} \left(x^{\frac{5}{4}} - 4 \right)^3 dx$$