

Integration By Parts

Evaluate each indefinite integral.

1) $\int x e^{-x} dx$

2) $\int x \cdot 2^x dx$

3) $\int x \ln x dx$

4) $\int \sqrt{x} \ln x dx$

5) $\int \log_2 x dx$

6) $\int x \ln x^2 dx$

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

8) $\int x e^x dx$

$$9) \int x \cdot 2^{-x} dx$$

$$10) \int \ln x dx$$

$$11) \int x \sin x dx$$

$$12) \int x \cos x dx$$

$$13) \int x^2 \ln x dx$$

$$14) \int \frac{\ln x}{x^2} dx$$

Integration By Parts

Evaluate each indefinite integral.

1) $\int x e^{-x} dx$

Use: $u = x$, $dv = e^{-x} dx$

$$\int x e^{-x} dx = \frac{-x - 1}{e^x} + C$$

2) $\int x \cdot 2^x dx$

Use: $u = x$, $dv = 2^x dx$

$$\int x \cdot 2^x dx = \frac{x \cdot 2^x}{\ln 2} - \frac{2^x}{(\ln 2)^2} + C$$

3) $\int x \ln x dx$

Use: $u = \ln x$, $dv = x dx$

$$\int x \ln x dx = \frac{2x^2 \ln x - x^2}{4} + C$$

4) $\int \sqrt{x} \ln x dx$

Use: $u = \ln x$, $dv = \sqrt{x} dx$

$$\int \sqrt{x} \ln x dx = \frac{2x^{\frac{3}{2}} \ln x}{3} - \frac{4x^{\frac{3}{2}}}{9} + C$$

5) $\int \log_2 x dx$

Use: $u = \log_2 x$, $dv = dx$

$$\int \log_2 x dx = x \log_2 x - \frac{x}{\ln 2} + C$$

6) $\int x \ln x^2 dx$

Use: $u = \ln x^2$, $dv = x dx$

$$\int x \ln x^2 dx = \frac{x^2 \ln x^2 - x^2}{2} + C$$

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

Use: $u = \ln x$, $dv = \frac{1}{\sqrt{x}} dx$

$$\int \frac{\ln x}{\sqrt{x}} dx = 2x^{\frac{1}{2}} \ln x - 4x^{\frac{1}{2}} + C$$

8) $\int x e^x dx$

Use: $u = x$, $dv = e^x dx$

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

$$9) \int x \cdot 2^{-x} dx$$

Use: $u = x, dv = 2^{-x} dx$

$$\int x \cdot 2^{-x} dx = -\frac{x}{2^x \ln 2} - \frac{1}{2^x \cdot (\ln 2)^2} + C$$

$$10) \int \ln x dx$$

Use: $u = \ln x, dv = dx$

$$\int \ln x dx = x \ln x - x + C$$

$$11) \int x \sin x dx$$

Use: $u = x, dv = \sin x dx$

$$\int x \sin x dx = -x \cos x + \sin x + C$$

$$12) \int x \cos x dx$$

Use: $u = x, dv = \cos x dx$

$$\int x \cos x dx = x \sin x + \cos x + C$$

$$13) \int x^2 \ln x dx$$

Use: $u = \ln x, dv = x^2 dx$

$$\int x^2 \ln x dx = \frac{x^3 \ln x}{3} - \frac{x^3}{9} + C$$

$$14) \int \frac{\ln x}{x^2} dx$$

Use: $u = \ln x, dv = \frac{1}{x^2} dx$

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