

Integration by Parts

Date _____ Period _____

Evaluate each indefinite integral using integration by parts. u and dv are provided.

1) $\int x e^x dx; u = x, dv = e^x dx$

2) $\int x \cos x dx; u = x, dv = \cos x dx$

3) $\int x \cdot 2^x dx; u = x, dv = 2^x dx$

4) $\int \sqrt{x} \ln x dx; u = \ln x, dv = \sqrt{x} dx$

Evaluate each indefinite integral.

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

6) $\int x^2 \cos 3x dx$

7) $\int \frac{x^2}{e^{2x}} dx$

8) $\int x^2 e^{5x} dx$

9) $\int \ln(x+3) dx$

10) $\int \cos 2x \cdot e^{-x} dx$

Integration by Parts

Evaluate each indefinite integral using integration by parts. u and dv are provided.

$$1) \int x e^x dx; u = x, dv = e^x dx$$

$$x e^x - e^x + C$$

$$2) \int x \cos x dx; u = x, dv = \cos x dx$$

$$x \sin x + \cos x + C$$

$$3) \int x \cdot 2^x dx; u = x, dv = 2^x dx$$

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

$$4) \int \sqrt{x} \ln x dx; u = \ln x, dv = \sqrt{x} dx$$

$$\frac{2x^{\frac{3}{2}} \ln x}{3} - \frac{4x^{\frac{3}{2}}}{9} + C$$

Evaluate each indefinite integral.

$$5) \int x e^{-x} dx$$

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

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

$$6) \int x^2 \cos 3x dx$$

$$\text{Use: } u = x^2, dv = \cos 3x dx$$

$$\int x^2 \cos 3x dx = \frac{x^2 \sin 3x}{3} + \frac{2x \cos 3x}{9} - \frac{2 \sin 3x}{27} + C$$

$$7) \int \frac{x^2}{e^{2x}} dx$$

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

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

$$8) \int x^2 e^{5x} dx$$

$$\text{Use: } u = x^2, dv = e^{5x} dx$$

$$\int x^2 e^{5x} dx = \frac{x^2 e^{5x}}{5} - \frac{2x e^{5x}}{25} + \frac{2e^{5x}}{125} + C$$

$$9) \int \ln(x+3) dx$$

$$\text{Use: } u = \ln(x+3), dv = dx \text{ *or use u-sub first}$$

$$\int \ln(x+3) dx = x \ln(x+3) - x + 3 \ln(x+3) + C$$

$$10) \int \cos 2x \cdot e^{-x} dx$$

$$\text{Use: } u = e^{-x}, dv = \cos 2x dx$$

$$\int \cos 2x \cdot e^{-x} dx = \frac{2 \sin 2x - \cos 2x}{5e^x} + C$$