

Assignment: Integration by Parts

Date _____

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

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

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

Evaluate each indefinite integral.

3) $\int x \csc^2 3x \, dx$

4) $\int \sin^{-1} 5x \, dx$

5) $\int x^3 e^{-x^2} \, dx$

6) $\int \frac{(\ln 2x)^2}{x} \, dx$

7) $\int \cos 4s \cdot e^{-s} \, ds$

8) $\int \sin 3x \cdot e^x \, dx$

$$9) \int \cos \ln 3t \, dt$$

$$10) \int (\ln 3s)^2 \, ds$$



Answers to Assignment: Integration by Parts

1) $\frac{2x^2 \ln x - x^2}{4} + C$

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

3) Use: $u = x$, $dv = \csc^2 3x \, dx$

$$\int x \csc^2 3x \, dx = -\frac{x \cot 3x}{3} + \frac{\ln |\sin 3x|}{9} + C$$

4) Use: $u = \sin^{-1} 5x$, $dv = dx$

$$\int \sin^{-1} 5x \, dx = x \sin^{-1} 5x + \frac{(1 - 25x^2)^{\frac{1}{2}}}{5} + C$$

5) Use: $u = x^2$, $dv = xe^{x^2} \, dx$

$$\int x^3 e^{x^2} \, dx = \frac{(x^2 - 1) \cdot e^{x^2}}{2} + C$$

6) Use: $u = \ln 2x$, $dv = \frac{\ln 2x}{x} \, dx$

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

7) Use: $u = e^{-s}$, $dv = \cos 4s \, ds$

$$\int \cos 4s \cdot e^{-s} \, ds = \frac{4 \sin 4s - \cos 4s}{17e^s} + C$$

8) Use: $u = \sin 3x$, $dv = e^x \, dx$

$$\int \sin 3x \cdot e^x \, dx = \frac{e^x \sin 3x - 3e^x \cos 3x}{10} + C$$

9) Use: $u = \cos \ln 3t$, $dv = dt$

$$\int \cos \ln 3t \, dt = \frac{t \cos \ln 3t + t \sin \ln 3t}{2} + C$$

10) Use: $u = (\ln 3s)^2$, $dv = ds$

$$\int (\ln 3s)^2 \, ds = s \cdot (\ln 3s)^2 - 2s \ln 3s + 2s + C$$

