Calculus Practice: Techniques for Finding Antiderivatives 20a

Evaluate each indefinite integral.

1) $\int x^2 \sin x \, dx$

A) Use: $u = x^2$, $dv = \sin x \, dx$
$\int x^2 \sin x \, dx = \frac{\sin x - \cos x}{2e^x} + C$

B) Use: $u = x^2$, $dv = \sin x \, dx$
$\int x^2 \sin x \, dx = \frac{e^x \sin x - e^x \cos x}{2} + C$

C) Use: $u = x^2$, $dv = \sin x \, dx$
$\int x^2 \sin x \, dx = \frac{x \sin \ln x - x \cos \ln x}{2} + C$

D) Use: $u = x^2$, $dv = \sin x \, dx$
$\int x^2 \sin x \, dx = -x^2 \cos x + 2x \sin x + 2\cos x + C$

2) $\int x^2 e^x \, dx$

A) Use: $u = x^2$, $dv = e^x \, dx$
$\int x^2 e^x \, dx = x \cdot (\ln 2x)^2 - 2x \ln 2x + 2x + C$

B) Use: $u = x^2$, $dv = e^x \, dx$
$\int x^2 e^x \, dx = \frac{-2x^2 - 2x - 1}{4e^{2x}} + C$

C) Use: $u = x^2$, $dv = e^x \, dx$
$\int x^2 e^x \, dx = \frac{2^x \left(x^2 \cdot (\ln 2)^2 - 2x \ln 2 + 2\right)}{(\ln 2)^3} + C$

D) Use: $u = x^2$, $dv = e^x \, dx$
$\int x^2 e^x \, dx = x^2 e^x - 2xe^x + 2e^x + C$

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

A) Use: $u = x^2$, $dv = \cos x \, dx$

$$\int x^2 \cos x \, dx = -x^2 \cos x + 2x\sin x + 2\cos x + C$$

B) Use: $u = x^2$, $dv = \cos x \, dx$

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

C) Use: $u = x^2$, $dv = \cos x \, dx$

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$$\int x^2 \cos x \, dx = x^2 \sin x + 2x\cos x - 2\sin x + C$$

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

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

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

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

$$\int x^2 \cdot 2^x \, dx = x \cdot (\ln 2x)^2 - 2x\ln 2x + 2x + C$$

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

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

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

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

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

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

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

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

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

C) $2x + C$

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

$$\int x^2 e^{-x} \, dx = x^2 e^x - 2xe^x + 2e^x + C$$

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

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

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

C) $2x + C$

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

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