

Please work alone, and keep your eyes on your own paper. Show *all* work to receive full credit (including the appropriate antiderivatives).

1. (10 points) Evaluate the following integral using integration by parts. Show your choice of u and v *explicitly*.

$$\int x(3x+10)^{49} dx$$

Let $u = x$

$du = dx$

$dv = (3x+10)^{49} dx$ $v = \frac{1}{50} (3x+10)^{50} = \frac{1}{3}$
 $= \frac{1}{150} (3x+10)^{50}$

$$\int x(3x+10)^{49} dx$$

$$= \frac{x}{150} (3x+10)^{50} - \frac{1}{150} \int (3x+10)^{50} dx$$

$$= \frac{x}{150} (3x+10)^{50} - \frac{1}{150} (3x+10)^{51} \cdot \frac{1}{51} = \frac{1}{3} + C$$

$$= \frac{x}{150} (3x+10)^{50} - \frac{1}{150 \cdot 51} (3x+10)^{51} + C$$

Rubric

- +1 each for $u, dv, \underline{\text{correct}} du$ and $\underline{\text{correct}} v$ (4 total)
- +3 for using $\int u dv = uv - \int v du$ (partial credit for each part)
- +2 final answer - either $\frac{1}{150 \cdot 51}$ or $\frac{1}{3 \cdot 51 \cdot 150}$ or $\frac{1}{22950}$ is OK
- (+1 for +C)

Quiz #3

2. (10 points) Evaluate the following integral using techniques from Section 7.3.

$$\int \cos^5 \theta \, d\theta$$

$$\int \cos^5 \theta \, d\theta = \int (\cos^4 \theta) \cos \theta \, d\theta$$

$$= \int (\cos^2 \theta)^2 \cos \theta \, d\theta$$

$$= \int (1 - \sin^2 \theta)^2 \cos \theta \, d\theta$$

$$= \int (1 - 2\sin^2 \theta + \sin^4 \theta) \cos \theta \, d\theta$$

Let
 $u = \sin \theta$
 $du = \cos \theta \, d\theta$

$$= \int (1 - 2u^2 + u^4) \, du$$

$$= u - \frac{2}{3}u^3 + \frac{1}{5}u^5 + C$$

$$= \sin \theta - \frac{2}{3} \sin^3 \theta + \frac{1}{5} \sin^5 \theta + C$$

Rubric

+2 Factored out $\cos \theta$

+2 used $\cos^4 \theta = (\cos^2 \theta)^2$

+2 used $\cos^2 \theta = 1 - \sin^2 \theta$

+1 chose $u = \sin \theta$, $du = \cos \theta \, d\theta$

+2 Final answer

+1 +C