

QUIZ 6 SOLUTIONS: LESSON 4
JANUARY 23, 2019

Write legibly, clearly indicate the question you are answering, and put a box or circle around your final answer. If you do not clearly indicate the question numbers, I will take off points. Write as much work as you need to demonstrate to me that you understand the concepts involved. If you have any questions, raise your hand and I will come over to you.

1. [4 pts] Evaluate $\int 6x \ln(x^4) dx$.

$$\int 6x \ln(x^4) dx = \int 4 \cdot 6x \ln x dx$$

$$= \int 24x \ln x dx$$

By LIATE, $u = \ln x$ so

$$u = \ln x \quad dv = 24x dx$$

$$du = \frac{1}{x} dx \quad v = 12x^2$$

$$\int 24x \ln x dx = \underbrace{\ln x}_{u} \underbrace{(12x^2)}_{v} - \int \underbrace{12x^2}_{v} \underbrace{\left(\frac{1}{x} dx\right)}_{du}$$

$$= 12x^2 \ln x - 12 \int x dx$$

$$= 12x^2 \ln x - 12 \left(\frac{1}{2}\right) x^2 + C$$

$$= \boxed{12x^2 \ln x - 6x^2 + C}$$

2. [6 pts] Evaluate $\int_0^{\pi/5} 3x \cos(5x) dx$.

By LIATE, $u = x$ so

$$u = x \quad dv = 3 \cos(5x) dx$$

$$du = dx \quad v = \frac{3}{5} \sin(5x)$$

$$\int_0^{\pi/5} 3x \cos(5x) dx$$

$$= \underbrace{x}_{u} \underbrace{\left(\frac{3}{5} \sin(5x)\right)}_{v} \Big|_0^{\pi/5} - \int_0^{\pi/5} \underbrace{\frac{3}{5} \sin(5x)}_{v} \underbrace{dx}_{du}$$

$$= \frac{3}{5} x \sin(5x) \Big|_0^{\pi/5} - \frac{3}{5} \left(-\frac{1}{5} \cos(5x)\right) \Big|_0^{\pi/5}$$

$$= \frac{3}{5} x \sin(5x) + \frac{3}{25} \cos(5x) \Big|_0^{\pi/5}$$

$$= \frac{3}{5} \left(\frac{\pi}{5}\right) \sin\left(5\left(\frac{\pi}{5}\right)\right) + \frac{3}{25} \cos\left(5\left(\frac{\pi}{5}\right)\right)$$

$$- \left(\frac{3}{5}(0) \sin(5 \cdot 0) + \frac{3}{25} \cos(5 \cdot 0)\right)$$

$$= \frac{3\pi}{25} \sin(\pi) + \frac{3}{25} \cos(\pi) - \frac{3}{25} \cos(0)$$

$$= \frac{-3}{25} - \frac{3}{25} = \boxed{\frac{-6}{25}}$$

Unless explicitly told otherwise,
 Keep your calculator in radians