

Instructions: Include all relevant work to get full credit. Write your solutions using proper notations. Encircle your final answers.

Quiz #17

1. Evaluate the following definite integrals:

a. $\int_0^2 \left(\frac{4}{5}x^3 - \frac{3}{4}x^2 + \frac{2}{5}x + 3 \right) dx$ [3]

$$= \left(\frac{x^4}{5} - \frac{x^3}{4} + \frac{x^2}{5} + 3x \right) \Big|_0^2$$

$$= \left(\frac{16}{5} - \frac{8}{4} + \frac{4}{5} + 6 \right) - (0 - 0 + 0 + 0)$$

$$= \frac{20}{5} - 2 + 6 = 4 + 4 = 8$$

b. $\int_1^4 \frac{10 + 5x^2}{2\sqrt{x}} dx$ [3]

$$= \int_1^4 \left(5x^{-1/2} + \frac{5}{2}x^{3/2} \right) dx$$

$$= \left(5 \frac{x^{1/2}}{1/2} + \frac{5}{2} \cdot \frac{x^{5/2}}{(5/2)} \right) \Big|_1^4$$

$$= (10\sqrt{x} + x^{5/2}) \Big|_1^4$$

$$= (10(2) + 32) - (10 + 1)$$

$$= 52 - 11$$

$$= 41$$

c. $\int_0^{\pi/4} (1 + \tan \theta)^3 \sec^2 \theta d\theta$ [4]

Let $u = 1 + \tan \theta$

$du = \sec^2 \theta d\theta$

when $\theta = 0 \rightarrow \tan \theta = 0 \rightarrow u = 1$

$\theta = \frac{\pi}{4} \rightarrow \tan \theta = 1 \rightarrow u = 2$

$$= \int_1^2 u^3 du = \frac{1}{4} u^4 \Big|_1^2$$

$$= \frac{1}{4} (2^4 - 1^4)$$

$$= \frac{1}{4} (16 - 1)$$

$$= \frac{15}{4}$$