QUIZ 2 SOLUTIONS: LESSON 1
AUGUST 24, 2018

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 $\displaystyle\int x^4 e^{x^5}\, dx$.

Solution: Let $u = x^5$, then

$$du = 5x^4\, dx \Rightarrow \frac{du}{5x^4} = dx.$$

So,

$$\int x^4 e^{x^5}\, dx = \int x^4 e^u \left(\frac{du}{5x^4}\right)$$

$$= \int \frac{1}{5} e^u\, du$$

$$= \frac{1}{5} e^u + C$$

$$= \boxed{\frac{1}{5} e^{x^5} + C}$$

2. [6 pts] Evaluate $\displaystyle\int \frac{4}{3} x \sqrt{x^2 + 3}\, dx$.

Solution: First, take $u = x^2 + 3$, then

$$du = 2x\, dx \Rightarrow \frac{du}{2x} = dx.$$

Next, write

$$\int \frac{4}{3} x \sqrt{x^2 + 3}\, dx = \int \frac{4}{3} x \sqrt{u} \left(\frac{du}{2x}\right)$$

$$= \int \frac{2}{3} \sqrt{u}\, du$$

$$= \frac{2}{3} \int u^{1/2}\, du$$

$$= \frac{2}{3} \left(\frac{1}{1/2 + 1} \right) u^{1/2+1} + C$$

$$= \frac{2}{3} \left(\frac{1}{3/2} \right) u^{3/2} + C$$

$$= \frac{2}{3} \left(\frac{2}{3} \right) u^{3/2} + C$$

$$= \frac{4}{9} u^{3/2} + C$$

$$= \boxed{\frac{4}{9} (x^2 + 3)^{3/2} + C}$$