QUIZ 2 SOLUTIONS: LESSON 1
JANUARY 12, 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. [3 pts] Evaluate $\int \frac{5}{2} x e^{x^2}\, dx$.

$u = x^2$
$du = 2x\,dx$
$\frac{du}{2} = x\,dx$

$= \frac{5}{2}\int x e^{x^2} dx$

$= \frac{5}{2}\int e^{\overleftarrow{x^2}\,u}(\underbrace{x\,dx}_{du/2})$

$= \frac{5}{2}\int e^u \left(\frac{du}{2}\right)$

$= \frac{5}{2}\left(\frac{1}{2}\right)\int e^u du$

$= \frac{5}{4}\int e^u du$

$= \frac{5}{4} e^u + C$

$= \boxed{\frac{5}{4} e^{x^2} + C}$

2. [3 pts] Evaluate $\int -4x^2(x^3+4)^{11}\, dx$.

$u = x^3 + 4$
$du = 3x^2 dx$
$\frac{du}{3} = x^2 dx$

$= -4\int x^2 (x^3+4)^{11} dx$

$= -4\int (\underbrace{x^3+4}_{u})^{11} (\underbrace{x^2 dx}_{du/3})$

$= -4\int u^{11}\left(\frac{du}{3}\right)$

$= -\frac{4}{3}\int u^{11} du$

$= -\frac{4}{3}\left(\frac{1}{11+1}\right) u^{11+1} + C$

$= \frac{-4}{3}\left(\frac{1}{12}\right) u^{12} + C$

$= \frac{-4}{36} u^{12} + C$

$= \frac{-1}{9} u^{12} + C$

$= \boxed{-\frac{1}{9}(x^3+4)^{12} + C}$

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$\frac{1}{x^4} = x^{-4}$

$\frac{1}{x^5} = x^{-5}$

3. [4 pts] Evaluate $\int -\frac{7}{x^5}\sin\left(\frac{1}{x^4}\right)dx$.

$$\int -\frac{7}{x^5}\sin\left(\frac{1}{x^4}\right)dx = \int -7x^{-5}\sin(x^{-4})dx$$

$u = x^{-4}$

$du = -4x^{-4-1}dx = -4x^{-5}dx$

$\frac{du}{4} = -x^{-5}dx$

$$= 7\int -x^{-5}\sin(x^{-4})dx$$

$$= 7\int \sin(\underbrace{x^{-4}}_{u})\underbrace{(-x^{-5}dx)}_{du/4}$$

$$= 7\int \sin(u)\left(\frac{du}{4}\right)$$

$$= \frac{7}{4}\int \sin(u)\,du$$

$$= \frac{7}{4}(-\cos(u)) + C$$

$$= \boxed{-\frac{7}{4}\cos(x^{-4}) + C}$$

$\int \sin(y)dy = -\cos y + C$