

QUIZ 2 SOLUTIONS: LESSON 1
AUGUST 25, 2017

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.

Evaluate the following:

(1) [2 pts] $\int x e^{x^2} dx$

Solution: Take $u = x^2$, then $du = 2x dx \Rightarrow \frac{du}{2} = x dx$. So

$$\begin{aligned}\int x e^{x^2} dx &= \int e^u \left(\frac{du}{2} \right) \\ &= \int \frac{1}{2} e^u du \\ &= \frac{1}{2} e^u + C \\ &= \boxed{\frac{1}{2} e^{x^2} + C}\end{aligned}$$

(2) [2 pts] $\int \sqrt{x+2} dx$

Solution: Take $u = x + 2$, then $du = dx$. Write

$$\begin{aligned}\int \sqrt{x+2} dx &= \int \sqrt{u} du \\ &= \frac{2}{3} u^{3/2} + C \\ &= \boxed{\frac{2}{3} (x+2)^{3/2} + C}\end{aligned}$$

(3) [3 pts] $\int (\cos x)^2 \sin x \, dx$

Solution: Take $u = \cos x$, then $du = -\sin x \, dx \Rightarrow -du = \sin x \, dx$. Hence

$$\begin{aligned} \int (\cos x)^2 \sin x \, dx &= \int (u^2)(-du) \\ &= \int -u^2 \, du \\ &= -\frac{1}{3}u^3 + C \\ &= \boxed{-\frac{1}{3}(\cos x)^3 + C} \end{aligned}$$

(4) [3 pts] $\int x^2(x^3 + 4)^9 \, dx$

Solution: Take $u = x^3 + 4$, then $du = 3x^2 \, dx \Rightarrow \frac{du}{3} = x^2 \, dx$. Write

$$\begin{aligned} \int x^2(x^3 + 4)^9 \, dx &= \int u^9 \left(\frac{du}{3} \right) \\ &= \int \frac{1}{3}u^9 \, du \\ &= \frac{1}{30}u^{10} + C \\ &= \boxed{\frac{1}{30}(x^3 + 4)^{10} + C} \end{aligned}$$