

QUIZ #9 @ 25 points

Write neatly. Show all work. Use only information covered up to this point.

Write all responses on separate paper. Clearly label the exercises.

Find the following:

1) $\int \left(5x - \frac{3}{x^{1/2}} \right) dx$

2) $\int (e^{2x} + x^5 - 4^x) dx$

3) $\int \left(3 \cos 2t - \frac{1}{2} \sin \frac{t}{3} \right) dt$

4) $\int \ln x dx$

5) $\int x^2 \sin x dx$

Quiz # 9 - Solutions

① $\int (5x - \frac{3}{x^{\frac{1}{2}}}) dx = 5 \int x dx - 3 \int x^{-\frac{1}{2}} dx$

$$= 5 \cdot \frac{x^2}{2} - 3 \cdot \frac{x^{\frac{1}{2}}}{\frac{1}{2}} + C$$

$$= \left| \frac{5x^2}{2} - 6x^{\frac{1}{2}} + C \right|$$

② $\int (e^{2x} + x^5 - 4^x) dx =$

$$= \int e^{2x} dx + \int x^5 dx - \int 4^x dx$$

$$= \left| \frac{e^{2x}}{2} + \frac{x^6}{6} - \frac{4^x}{\ln 4} + C \right|$$

③ $\int (3 \cos 2t - \frac{1}{2} \sin \frac{t}{3}) dt$

$$= 3 \int \cos 2t dt - \frac{1}{2} \int \sin \frac{t}{3} dt$$

$$= 3 \frac{\sin 2t}{2} - \frac{1}{2} \frac{-\cos \frac{t}{3}}{\frac{1}{3}} + C$$

$$= \left| \frac{3}{2} \sin 2t + \frac{3}{2} \cos \frac{t}{3} + C \right|$$

④ $\int \ln x dx$ - use integration by parts

$$\left[\begin{array}{l} f = \ln x \rightarrow g' = 1 \\ f' = \frac{1}{x} \leftarrow g = x \end{array} \right.$$

$$\int \ln x dx = x \ln x - \int \frac{1}{x} \cdot x dx$$

$$= x \ln x - \int dx$$

$$= \left| x \ln x - x + C \right|$$

⑤ $\int x^2 \sin x dx$ - use integration by parts

$$\left[\begin{array}{l} f = x^2 \rightarrow g' = \sin x \\ f' = 2x \leftarrow g = -\cos x \end{array} \right.$$

$$\int x^2 \sin x dx = -x^2 \cos x + 2 \int x \cos x dx$$

use integration by parts

$$\left[\begin{array}{l} f = x \rightarrow g' = \cos x \\ f' = 1 \leftarrow g = \sin x \end{array} \right.$$

$$\int x^2 \sin x dx =$$

$$= -x^2 \cos x + 2 \left(x \sin x - \int \sin x dx \right)$$

$$= -x^2 \cos x + 2x \sin x - 2 \int \sin x dx$$

$$= -x^2 \cos x + 2x \sin x - 2(-\cos x) + C$$

$$= \left| -x^2 \cos x + 2x \sin x + 2 \cos x + C \right|$$