

Quiz 9 Practice Solutions

Evaluate the following integrals.

1.
$$\int (8x^5 - 6x^2 + e^x) dx = 8 \int x^5 dx - 6 \int x^2 dx + \int e^x dx$$
$$= \boxed{\frac{8x^6}{6} - 6 \frac{x^3}{3} + e^x + C}$$
$$= \frac{4}{3}x^6 - 2x^3 + e^x + C$$

2.
$$\int \left(\frac{4}{x^2} - \frac{10}{x} + 6 \right) dx = 4 \int x^{-2} dx - 10 \int x^{-1} dx + \int 6 dx$$
$$= \boxed{4 \frac{x^{-1}}{-1} - 10 \ln|x| + 6x + C}$$
$$= -\frac{4}{x} - 10 \ln|x| + 6x + C$$

3.
$$\int (x^3 - 8x^2 + 5x)^3 (3x^2 - 16x) dx = \int u^3 du$$
$$= \frac{u^4}{4} + C$$
$$= \boxed{\frac{(x^3 - 8x^2 + 5x)^4}{4} + C}$$

$u = x^3 - 8x^2 + 5x$
 $\frac{du}{dx} = 3x^2 - 16x$
 $du = (3x^2 - 16x) dx$

4.
$$\int \sqrt{x^4 + 6x} (8x^3 + 12) dx = \int \sqrt{u} \cdot 2 du$$
$$= 2 \int u^{1/2} du$$
$$= 2 \frac{u^{3/2}}{3/2} + C$$
$$= \boxed{\frac{2 (x^4 + 6x)^{3/2}}{3/2} + C}$$
$$= \frac{4}{3} (x^4 + 6x)^{3/2} + C$$

$u = x^4 + 6x$
 $\frac{du}{dx} = 4x^3 + 6$
 $du = (4x^3 + 6) dx$
 $2 du = (8x^3 + 12) dx$

$$5. \int e^{x^2-2} \cdot 2x dx = \int e^u du$$

$$= e^u + C$$

$$= \boxed{e^{x^2-2} + C}$$

$$u = x^2 - 2$$

$$\frac{du}{dx} = 2x$$

$$du = 2x dx$$