Quiz 1 Review Answers

For questions 1–4, find each indefinite integral.

1. $\int (4x^3 - 5)dx$

$\boxed{x^4 - 5x + C}$

2. $\int \sqrt[4]{x}\, dx$

$\boxed{\frac{4}{5}x^{5/4} + C}$

3. $\int \frac{x^5 + 5}{x^5} dx$

$\boxed{\begin{array}{l} \int (1 + 5x^{-5})dx \\ x - \frac{5}{4x^4} + C \end{array}}$

4. $\int (-5\sin x)dx$

$\boxed{5\cos x + C}$

5. Solve the differential equation $\frac{dy}{dx} = \frac{3}{x^3}$ with initial condition $y = 0$ when $x = 2$.

$\boxed{\begin{array}{c} dy = 3x^{-3}dx \\ \int dy = \int 3x^{-3}dx \\ y = -\frac{3}{2x^2} + C \end{array}}$

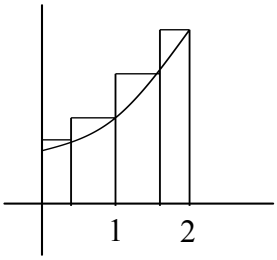
$\boxed{\begin{array}{l} 0 = -\frac{3}{2(2)^2} + C \\ 0 = -\frac{3}{8} + C \\ C = \frac{3}{8} \end{array}}$

$\boxed{y = -\frac{3}{2x^2} + \frac{3}{8}}$

6. Find the sum $\sum_{i=1}^{3} i^3$.

$\boxed{\begin{array}{l} 1^3 + 2^3 + 3^3 \\ 1 + 8 + 27 \\ 36 \end{array}}$

7. Find the upper Riemann sum of $f(x) = x^2 + 1$ on [0, 2] with $n = 4$. (Draw and label your rectangles.)



$$\Delta x = \frac{2-0}{4} = \frac{1}{2}$$

$$U = \frac{1}{2}\left[f\left(\frac{1}{2}\right) + f(1) + f\left(\frac{3}{2}\right) + f(2)\right]$$
$$U = \frac{1}{2}\left(\frac{5}{4} + 2 + \frac{13}{4} + 5\right)$$
$$U = \frac{1}{2}\left(\frac{23}{2}\right)$$
$$U = \frac{23}{4}$$

For questions 8 and 9, evaluate each definite integral.

8. $\int_0^3 (x^3 + 2)\,dx$

$$\left[\frac{1}{4}x^4 + 2x\right]_0^3 = \frac{81}{4} + 6 = \frac{105}{4}$$

9. $\int_0^{\pi/2} \cos x\,dx$

$$\sin x\Big]_0^{\pi/2} = \sin\frac{\pi}{2} - \sin 0 = 1 - 0 = 1$$