Use the Power Rule to find the integral of each of the following:

1. \( f(x) = x^5 \)
2. \( f(x) = \frac{5}{x^3} \)
3. \( f(x) = \sqrt{x^2} \)

Find each of the following:

4. \( \int (4x^3 - 6x^2 + x - 5) \, dx \)
5. \( \int \frac{3x^2 - 2}{\sqrt{x}} \, dx \)
6. Given \( f'(x) = 6x - 4 \) and \( f(2) = -1 \), find \( f(x) \).
7. Given the marginal cost (in dollars per unit) for producing \( x \) units is
   \[ MC = 10x - 10 \]
   If the cost to produce 25 items is $2895, find the cost function.
8. Determine the step size \( \Delta x \) when \( n = 20 \) on the interval \([3, 18]\).
9. Find the (a) Left Sum, (b) Right Sum, to approximate the area under the graph of \( f(x) = 2x^2 + 5 \) over the interval \([-2, 5]\), with \( n = 14 \).
10. Find the exact value of the definite integrals below:
    a. \( \int_{-4}^{-1} (x^2 + 3) \, dx \)
    b. \( \int_{-2}^{1} (16 - x^2) \, dx \)
    c. \( \int_{1}^{4} x(\sqrt{x} - 2) \, dx \)
11. Write a definite integral which represents the shaded area below:
    a. \( f(x) = -4x + 4x + 20 \)

12. Find the gross area between the graph of \( f(x) = 16 - 4\sqrt{x} \) and the x-axis over the interval \([4, 25]\).
13. The velocity function for the object in feet per second is given by the function \( v(t) = 8t - 12 \)
    a. Find \( v(2) \) and interpret.
    b. Evaluate \( \int_{1}^{10} v(t) \, dt \) and interpret.
14. Approximate the area under the function \( f(x) = 2x^2 + x + 6 \) on the interval \([2, 5]\) using \( n = 10 \),
    a. from the left.
    b. from the right.
15. How many rectangles should be used in problem number 14, so that the left and right sums are within 1 unit?

**ANSWERS:**

1. \( \frac{1}{6}x^6 + C \)
2. \( -\frac{5}{2x^2} + C \)
3. \( \frac{5}{7}x^{\frac{5}{2}} + C \)
4. \( x^4 - 2x^3 + \frac{1}{2}x^2 - 5x + C \)
5. \( \frac{6}{5}x^{\frac{5}{2}} - 4x^{\frac{3}{2}} + C \)
6. \( f(x) = 3x^2 - 4x - 5 \)
7. \( C = 5x^2 - 10x + 20 \)
8. \( \Delta x = \frac{3}{4} \)

9. a) 113.75; b) 134.75

10. a) 102; b) 45; c) -2.6

11. a) \( A = \int_{0}^{1} (-4x^2 + 4x + 20) \, dx \)

11. b) \( A = \int_{1}^{8} 4x^2 \, dx \)

11. c) \( A = \int_{-5}^{-3} (-2x - 6) \, dx + \int_{-3}^{0} (2x + 6) \, dx \)

12. Gross Area = 61\( \frac{1}{3} \); Net Area = 24

13. a) At 2 sec, the speed of the object is 4 ft/sec.

13. b) The object traveled 288 feet in the time interval from 1 sec to 10 sec.

14. a) 99.84

14. b) 113.34

15. n=135