M119 Review Problems for Chapter 5.1, 5.3, & 5.4

1. $\int x^5\,dx$

2. $\int \frac{1}{2x^3}\,dx$

3. $\int \sqrt[3]{x}\,dx$

4. $\int \left(4e^x + 4x^3 - \frac{1}{x} + 6\right)dx$

5. $\int x^3(2x + \frac{1}{x})dx$

6. Find the equation of the function whose tangent has slope $3x^2 + 6x - 2$ for each value of x and the graph passes through the point (0,6)

7. A manufacturer has found that marginal cost is $4q + 3$ dollars per unit when q units have been produced. The total cost (including overhead) of producing the 1st unit is $150. What is the total cost of producing the first 8 units?

8. Evaluate the definite integral: $\int_0^4 \left(\sqrt{x} + x - 3)dx\right)$

9. Evaluate the definite integral: $\int_1^2 \left(1 - \frac{3}{x} + \frac{5}{x^3}\right)dx$

10. A study indicates that x months from now the population of a certain town will be increasing at the rate of $10 + 2\sqrt{x}$ people per month. By how much will the population increase over the next 9 months.

11. An object is moving along a straight line in such a way that after t minutes, its speed is $v(t) = 4t^2 + 3t + 1$ meters per minute. How far does the object travel during the 3rd minute?

12. Use integration to find the area of the region under the curve $y = 4 - 3x^2$ between $x = -1$ and $x = 1$.

13. Find the area bounded by the curve $y = 2 + x - x^2$ and the x-axis.

14. Find the area of the region bounded by the parabola $y = 4x - x^2$ and the line $y = 2x - 3$.

SOLUTIONS

1. $\frac{1}{6}x^6 + C$ 2. $-\frac{1}{4x^2} + C$ 3. $\frac{3}{4}\sqrt[3]{x^4} + C$
4. $4e^x + x^4 - \ln x + 6x + C$ 5. $\frac{2}{5}x^5 + \frac{1}{3}x^3 + C$ 6. $y = x^3 + 3x^2 - 2x + 6$
7. 297 8. $\frac{4}{3} \sim 1.33$ 9. 0.796
10. 126 11. 33.83 12. 6
13. 4.5 14. 10.67