Spring 2015 Math 151

Week in Review 10

courtesy: Amy Austin

(Covering 5.5-6.1)

**Section 5.5**

1. A rectangular storage container with an open top is to have a volume of 10 cubic meters. The length of its base is twice the width. Material for the base costs $10 per square meter. Material for the sides costs $6 per square meter. Find the cost of materials for the cheapest such container.

2. Find the point on the parabola \( x + y^2 = 0 \) that is closest to the point \((0, -3)\).

3. A piece of wire 12 inches long is cut into two pieces. One piece is bent into an equilateral triangle and the other is bent into a circle. How should the wire be cut so that the total area enclosed is a maximum? A minimum?

4. What are the dimensions of the largest rectangle that can be inscribed in the area bounded by the curve \( y = 12 - x^2 \) and the x-axis?

**Section 5.7**

5. Given \( f''(x) = 2e^x - 4\sin(x) \), \( f(0) = 1 \), and \( f'(0) = 2 \), find \( f(x) \).

6. A particle accelerates according to the equation \( a(t) = .12t^2 + 4 \). If the initial velocity is 10 and the initial position is 0, find the position function \( s(t) \).

7. A stone is dropped from a 450 meter tall building.
   a.) Derive a formula for the height of the stone at time \( t \). Note the acceleration due to gravity is \(-9.8\) meters per second squared.
   b.) With what velocity does the stone hit the ground?

8. A car is traveling at a speed of \( 220 \) feet per second when the brakes are fully applied thus producing a constant deceleration of 40 feet per second squared. How far does the car travel before coming to a stop?

9. Find the vector functions that describe the velocity and position of a particle that has an acceleration of \( \mathbf{a}(t) = (0, 2) \), initial velocity of \( \mathbf{v}(0) = (1, -1) \) and an initial position of \( \mathbf{r}(0) = (0, 0) \).

**Section 6.1**

10. Compute \( \sum_{i=2}^{5} \frac{i}{i+1} \)

11. Compute \( \sum_{i=1}^{500} 9 \)

12. Compute \( \sum_{i=3}^{300} 2 \)

13. Using the formula \( \frac{n(n+1)}{2} \), find \( \sum_{i=1}^{99} 4i \).

14. Write in sigma notation:
   a.) \( \sqrt{3} + \sqrt{4} + \sqrt{5} + \sqrt{6} + \sqrt{7} \)
   b.) \( 1 + \frac{1}{4} + \frac{1}{9} + \frac{1}{16} + \frac{1}{25} \)
   c.) \( 1 - x + x^2 - x^3 + x^4 - x^5 + x^6 \)