Name: _____ AP Calculus AB Problem Set #7

1. An open box is to be made from a 8.5 in by 11 in piece of cardboard by cutting out squares of equal size from the four corners and bending up the sides.

Let x be the length of each of the squares to be cut out.

a. Find and the value of x that will provide the maximum volume.

b. Find the maximum volume possible

2. Find the radius and height of the right circular cylinder of largest volume that can be inscribed in a right circular cone with radius 6 inches and height 10 inches.

3. A rectangle has its two lower corners on the *x*-axis and its two upper corners on the curve $y = 16 - x^2$. For all such rectangles, what are the dimensions of the one with the largest area?

4. A container with square base, vertical sides, and open top is to be made from 1000 sq. ft of material. Find the dimensions of the container with the greatest volume.

5. A firm determines that x units of its product can be sold daily at p dollars per unit where $x = 1000 - p$. The cost of producing x units per day is $C(x) = 3000 + 20x$

a. Find the profit function $P(x)$

b. Assuming that the production capacity is at most 500 units per day, determine how many units the company must product and sell each day to maximize the profit.

c. What price per unit must be charged to obtain the maximum profit?

d. Find the maximum profit.

6. There are 50 apple trees in an orchard. Each tree produces 800 apples. For each additional tree planted in the orchard, the output per tree drops by 10 apples. How many trees should be added to the existing orchard in order to maximize the total output of trees? Show a revenue function and all work leading to your solution.