Calculus AB   Name_____

Worksheet 13 - Optimization

Period____

Solve each optimization problem using Calculus. Do not use your graphing calculator.

1) A rancher wants to construct two identical rectangular corrals using 500 ft of fencing. The rancher decides to build them adjacent to each other, so they share fencing on one side. What dimensions should the rancher use to construct each corral so that together, they will enclose the largest possible area?

2) Two vertical poles, one 4 ft high and the other 8 ft high, stand 9 feet apart on a flat field. A worker wants to support both poles by running rope from the ground to the top of each post. If the worker wants to stake both ropes in the ground at the same point, where should the stake be placed to use the least amount of rope?

3) A company has started selling a new type of smartphone at the price of $130 - 0.05x$ where x is the number of smartphones manufactured per day. The parts for each smartphone cost $40 and the labor and overhead for running the plant cost $6000 per day. How many smartphones should the company manufacture and sell per day to maximize profit?

4) A supermarket employee wants to construct an open-top box from a 10 by 16 in piece of cardboard. To do this, the employee plans to cut out squares of equal size from the four corners so the four sides can be bent upwards. What size should the squares be in order to create a box with the largest possible volume?

5) A geometry student wants to draw a rectangle inscribed in a semicircle of radius 5. If one side must be on the semicircle's diameter, what is the area of the largest rectangle that the student can draw?

6) Which point on the graph of $y = \sqrt{x}$ is closest to the point $(5, 0)$?