

## Assignment

Date \_\_\_\_\_ Period \_\_\_\_\_

**Solve each optimization problem.**

- 1) A farmer wants to construct a rectangular pigpen using 500 ft of fencing. The pen will be built next to an existing stone wall, so only three sides of fencing need to be constructed to enclose the pen. What dimensions should the farmer use to construct the pen with the largest possible area?
  
- 2) 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?
  
- 3) A cryptography expert is deciphering a computer code. To do this, the expert needs to minimize the product of a positive rational number and a negative rational number, given that the positive number is exactly 5 greater than the negative number. What final product is the expert looking for?
  
- 4) A rancher wants to construct two identical rectangular corrals using 400 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?
  
- 5) Engineers are designing a box-shaped aquarium with a square bottom and an open top. The aquarium must hold 256 ft<sup>3</sup> of water. What dimensions should they use to create an acceptable aquarium with the least amount of glass?
  
- 6) Which point on the graph of  $y = \sqrt{x}$  is closest to the point (6, 0)?
  
- 7) 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?
  
- 8) A geometry student wants to draw a rectangle inscribed in the ellipse  $x^2 + 4y^2 = 9$ . What is the area of the largest rectangle that the student can draw?

## Answers to Assignment (ID: 1)

1) 125 ft (perpendicular to wall) by 250 ft (parallel to wall)

2) 2 in

3)  $-\frac{25}{4}$

4) 50 ft (non-adjacent sides) by  $\frac{200}{3}$  ft (adjacent sides)

5) 8 ft by 8 ft by 4 ft tall

6)  $\left(\frac{11}{2}, \frac{\sqrt{22}}{2}\right)$

7) 25

8) 9