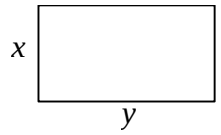
Math 113 worksheet 3.1b Quadratic Maximum and Minimum Applications DUE _____

1. The **position equation** for Earth, $s = -16t^2 + v_0 t + s_0$, represents the height (s) in feet of an object above ground at a time (t) measured in seconds. (For the Moon or other planets the leading coefficient will be different.) In this equation v_0 represents the initial velocity of the object and s_0 represents the initial height of the object. A bridge is 500 feet above a river. A rock is thrown up into the air at a velocity of 10 ft/sec. (a) How high does the rock go? (b) How long does it take to reach this height? You may use your calculator to answer these questions. On the Exam we would ask you only to show how you'd calculate the answers.

2. (a) Does the quadratic function $f(x) = 900 - 30x + 0.3x^2$ have a maximum value or a minimum value? (b) Show how you would calculate this maximum or minimum value. You may use your calculator to answer these question. On the Exam we would ask you only to show how you'd calculate the answer.

3. **Revenue** is the amount of money received when x units of a product are sold at a price in hundreds of dollars, P. Thus, revenue (R) can be expressed in a direct variation equation: $R = xP$. The **demand** equation for thingamabobs is $P = 50 - 0.0004x$, where price, P (in \$100), is expressed as a function of the number of units sold, x. Combine the two equations above to write a single quadratic equation expressing revenue as a function of the number of units sold, then use your equation to determine (a) the number of units which should be sold to achieve the maximum revenue. You should simplify the fraction without using your calculator. (b) Show how you would calculate the revenue that would be made this way.

4. Cowboy Bob has 600 ft. of fencing to enclose a rectangular corral for his ponies. (a) Write a quadratic equation that expresses the area of the corral in terms of its width x. (b) Use your equation from part a. to determine the dimensions that will provide the maximum possible area.



5. Rancher Sue has 920 ft. of fencing to enclose a set of adjacent corrals for her various critters (see diagram below). (a) Write a quadratic equation that expresses the area of the corral in terms of its width x. (b) Use your equation from part a. to determine the dimensions that will provide the maximum possible area.