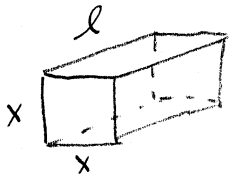
Math 171 - Quiz 8
October 30, 2014

Name key

Score _____

Show all work to receive full credit. Supply explanations when necessary.

1. (5 points) The U.S. post office will accept a box for shipment only if the sum of the length and girth (distance around) is at most 108 in. Find the dimensions of the largest acceptable box with square front and back.



Maximize $V = x^2\ell$

s.t. $4x + \ell = 108$

$\ell = 108 - 4x$

$V(x) = x^2(108 - 4x)$

$V(x) = 108x^2 - 4x^3, \quad 0 \le x \le \frac{108}{4} = 27$

$V'(x) = 216x - 12x^2 = 12x(18 - x) = 0$

$x = 0, \; x = 18$

$V(0) = 0$

$V(18) = 11664 \leftarrow$ Abs max

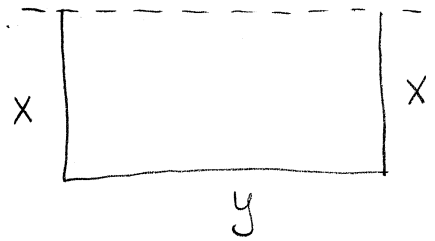
$V(27) = 0$

Dimensions are

18 in x 18 in

x 36 in

2. (5 points) You have 100 feet of fence to make a rectangular play area alongside the wall of your house. The wall of the house bounds one side. What is the largest size possible (in square feet) for the play area?



Maximize $A = xy$

s.t. $2x + y = 100$

$y = 100 - 2x$

$A(x) = x(100 - 2x)$

$A(x) = 100x - 2x^2, \quad 0 \le x \le 50$

$A'(x) = 100 - 4x = 0 \Rightarrow x = 25$

$A(0) = A(50) = 0$

$A(25) = 1250 \leftarrow$ Abs max

Max area is 1250 ft^2,

Dimensions are

25 ft x 50 ft