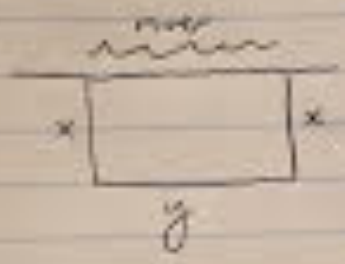
Optimization HW

(1.) U: (2400) [ft] of fence

No fence along the river

Question: A = ? (in terms of its side)
Max Area occurs when x = ?

P:



$2400 = x + x + y$ $A = xy$

$2400 - 2x = y$

S: $A = xy$

$A = x(2400 - 2x)$

$A = 2400x - 2x^2$ First Answer!

$A' = 2400 - 4x$

$0 = 2400 - 4x$

$4x = 2400$

$x = 600$

✓

The area for the field is $A = 2400x - 2x^2$ and the max Area will occur when $x = 600$ ft

2. V: OPEN Box Square base

Volume of 12 ft^3

Question: SA = _____ (in terms of l)

P: V = $x \times x \times h$ SA = $xh + xh + xh + xh + x^2$ (side side side side bottom)

SA = $4xh + x^2$

$12 = x^2 h$

$\frac{12}{x^2} = h$

S: $SA = 4xh + x^2$

$SA = 4x\left(\frac{12}{x^2}\right) + x^2$

$SA = \frac{48}{x} + x^2$

✓ the surface area of

A function for a box with no top is

$SA = \frac{48}{x} + x^2$

~~SA = $\frac{48}{x^2} + 2A$~~

3. U = ~~[crossed out]~~ garden, along the road
$5/ft - sturdy fence
$3/ft - non sturdy fence

1200 sq ft - area of garden

Question 1: Cost (C) = ________ (in terms of width along road)

Question 2: $600 to spend → range of widths

P:

$A = xy$

$1200 = xy$

$\frac{1200}{y} = x$

$C = y(5) + (x+x+y)(3)$

$C = 5y + 6x + 3y$

$C = 8y + 6x$

S: ~~[crossed out]~~

$C = 8y + 6\left(\frac{1200}{y}\right)$

$600 = 8y + \frac{7200}{y}$

$0 = 8y - 600 + \frac{7200}{y}$

multiply ALL TERMS BY y!!

$0 = 8y^2 - 600y + 7200$

$0 = y^2 - 75y + 900$

$0 = (y-60)(y-15)$

$y = 60 \quad y = 15$

Range of possible fence widths
$15 \le y \le 60$