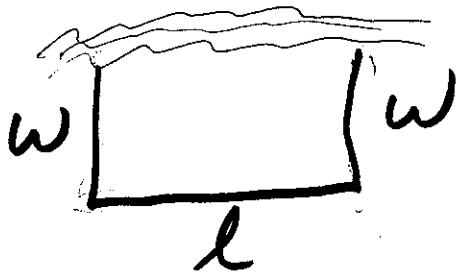
EX 3: Fence in 3 sides of a rectangle w/ 200m of fencing
Find max area

0) Draw a picture



1) Maximize?

$$A = lw$$

2) Eliminate variable to turn into a Calc 1 problem

$$l + 2w = 200$$

$$\Rightarrow \boxed{l = 200 - 2w} \star$$

3) Max calc 1 problem

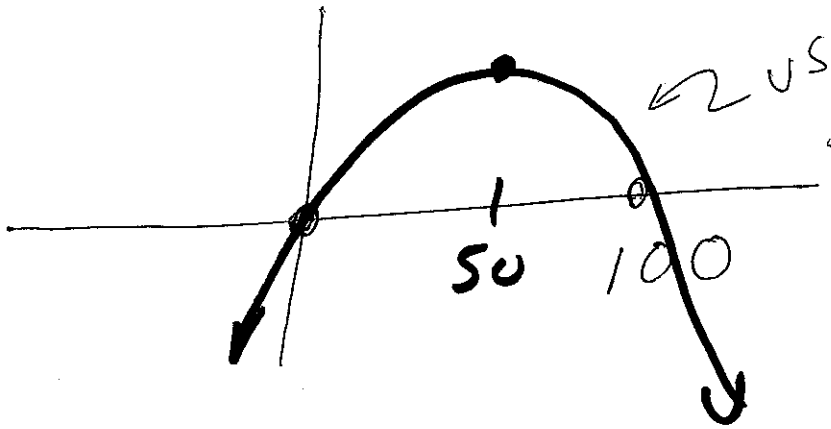
$$A(w) = (200 - 2w)w$$

$200 - 2w = 0 \Rightarrow w = 100$

$w = 0$

Method 1

$$A(w) = 200w - 2w^2$$



use pre calculus since its a parabola

Max occurs at $x = 50$

Method 2:

3a) $A'(w) = 200 - 4w = 0$, DNE

$\Rightarrow 200 = 4w$

$w = 50$

3b) Is it an abs max?

i) $A''(w) = -4 < 0$

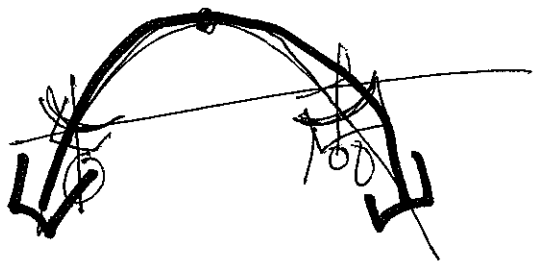
$A'(50) = 0$

$\Rightarrow$ max at $w = 50$

ii) EVT

$w \in [0, 100]$

Can also check if abs max occurs at $x = 50$ in $[0, 200]$ or $[-10, 1000]$



same answer for max

50	$(200-100)50 = 5000$
0	0
100	0

abs max

4) Answer

Max area $= 5000\ m^2$

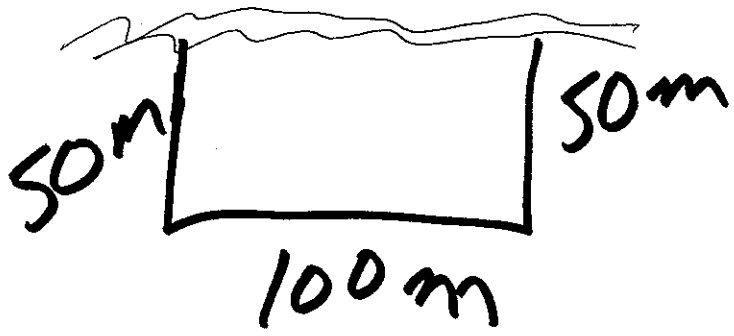
Dimensions

$w = 50\ m$

$l = 200 - 2(50)$

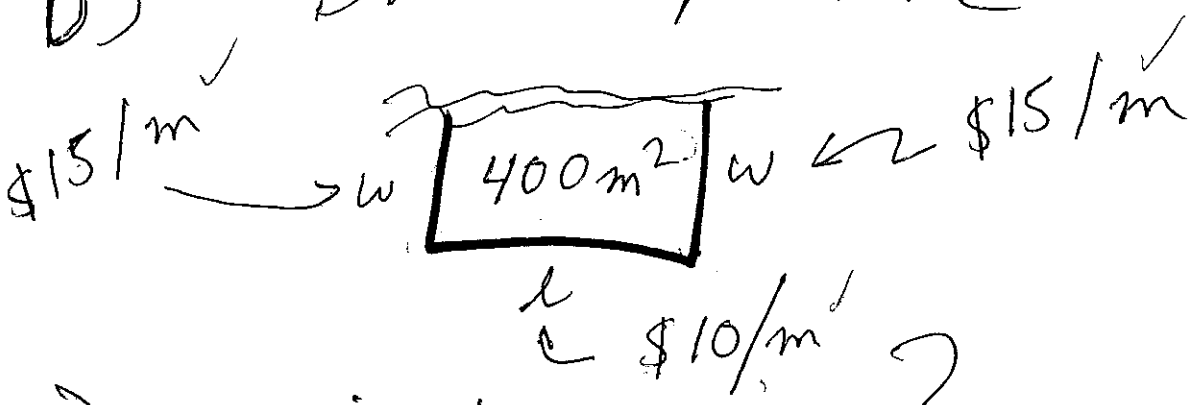
$= 200 - 100$

$= 100\ m$



4) ~~Contain~~ Fence off rectangular area containing $400 m^2$ next to a river. The two sides next to the river must use fencing costs $15/m while the remaining side will cost $10/m. What dimensions will min cost

0) Draw picture



1) Minimize ?

$$\text{Cost} = C = 10l + (15)(2w)$$

$$\left(\frac{\$}{m}\right)(m) \quad \left(\frac{\$}{m}\right) \; m$$

2) Eliminate variable

$$400 = lw$$

$$l = 400/w$$

3) Calc I problem

$$C(w) = 10\left(\frac{400}{w}\right) + 30w$$

3a) Find critical pts

$$C'(\omega) = -4000\omega^{-2} + 30$$

$$= 0, \text{DNE}$$

$$\omega \neq 0$$

$$\frac{-4000}{\omega^2} + 30 = 0$$