

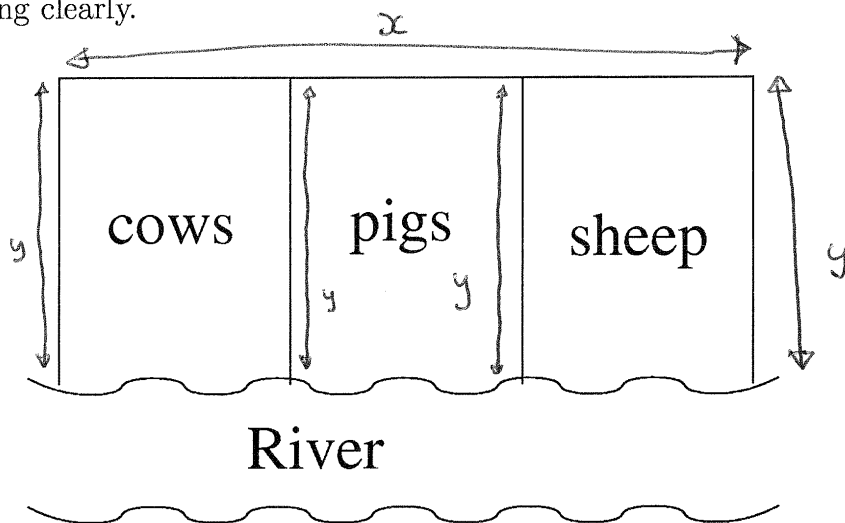
STUDENT NAME:

Calculus 1550, section 6. Wednesday, April 14, 2004. Sixteenth quiz.

A farmer wants to build an enclosure along side a river, divided into three equal sections, as shown below. Fencing is not required along the river.

He has 8000 ft of fencing. What is the maximum area of the enclosure he can make?

Show your working clearly.



let x be length of field, y width, as labeled

$$\text{total area} = x \times y = A(x, y)$$

$$\text{total fencing} = x + 4y$$

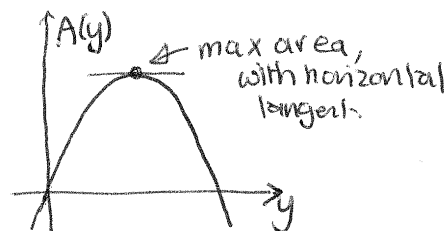
$$\text{constraint} = x + 4y = 8000 \Rightarrow x = 8000 - 4y$$

substitute x in equation for area

$$\text{area } A(y) = x \times y = (8000 - 4y) \times y$$

$$= 8000y - 4y^2$$

as a function of y , $A(y)$ has graph:



$$\frac{dA(y)}{dy} = 8000 - 8y \quad \text{so if } \frac{dA(y)}{dy} = 0, \text{ then } 8000 = 8y \Rightarrow y = 1000$$

$$\text{if } y = 1000, \quad x = 8000 - 4 \times 1000 = 4000$$

$$\text{so area is } x \times y = 1000 \times 4000,$$

$$\text{so max area is } 4000,000 \text{ ft.}$$