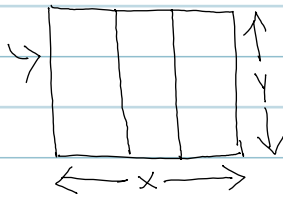


Optimization: Fencing Problem

A farmer with 1000m of fencing wants to enclose an area that is as large as possible and is further subdivided into three identical sections by lines of fencing that run parallel to one side of the rectangle. Find the total enclosed area.



$$A = x \cdot y$$

$$2x + 4y = 1000,$$

$$4y = 1000 - 2x$$

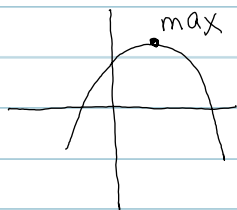
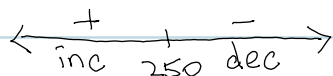
$$y = 250 - \frac{1}{2}x$$

$$\begin{aligned} \rightarrow A &= x(250 - \frac{1}{2}x) \\ &= 250x - \frac{1}{2}x^2 \end{aligned}$$

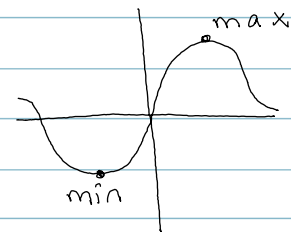
$$A' = 250 - x$$

$$0 = 250 - x$$

$$x = 250$$



Definition: The critical value of $f(x)$ is where $f'(x) = 0$ or is undefined.



$$\begin{aligned} y &= 250 - \frac{1}{2}x \\ &= 250 - \frac{1}{2}(250) \\ &= 250 - 125 \\ &= 125 \end{aligned}$$

$$\begin{aligned} A &= x \cdot y \\ &= 250 \cdot 125 \\ &= 31250 \text{ m}^2 \end{aligned}$$

The maximum area is 31250 m^2 .