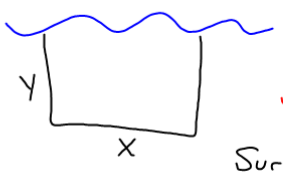
19



$xy = 180{,}000$ (Secondary)

$S = x + 2y$ (Primary)

S: Surface Area

x: only need one x since the river is the other side

① Solve Secondary for either x or y.

$$y = \frac{180000}{x}$$

② Plug into Primary

$$S = x + 2\left(\frac{180000}{x}\right)$$

③ Take Deriv.

$$S' = 1 - \frac{360{,}000}{x^2}$$

④ Find C.P.

$x = 600$

⑤ Find S''

$$S'' = \frac{720{,}000}{x^3} > 0 \text{ when } x = 600$$

So S is a min when $x = 600$m and $y = 300$.

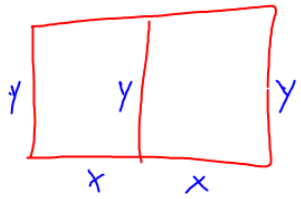
$xy = 180{,}000$

$600y = 180{,}000$

$y = 300$

(20) 200 ft of fencing is Perimeter!

Find max area!



Secondary: $P = 4x + 3y$

$200 = 4x + 3y$

Primary: $2xy = A$

(1) Pick x or y to solve for

$y = \frac{200 - 4x}{3}$

I took out a 4 and multiplied the x in!

(2) $2x\left(\frac{200 - 4x}{3}\right) = A$

$\frac{8}{3}(50x - x^2) = A$

(3) Take Deriv

$A' = \frac{8}{3}(50 - 2x)$

$x = 25$

(4) A''

$A'' = \frac{8}{3}(-2)$

$A'' = -\frac{16}{3} < 0$ when $x = 25$

$4x + 3y = 200$

$100 + 3y = 200$

$3y = 100$

$y = \frac{100}{3}$

∴ So A is a max when $x = 25$ ft and $y = \frac{100}{3}$ ft.