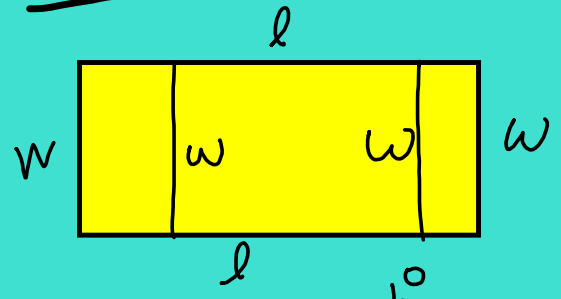
Optimization

Area / Business



$A = lw$

$A = (1500-2w)w$

$A = 1500w - 2w^2$

$A' = 1500 - 4w = 0$

$1500 = 4w$

$375 = w$

$A(375) = 281{,}250$

375

$2l + 4w = 3000$

$\frac{2l}{2} = \frac{3000}{2} - \frac{4w}{2}$

$l = 1500 - 2w$

(0, 750)

$\lim_{w \to 0} 1500w - 2w^2 = 0$

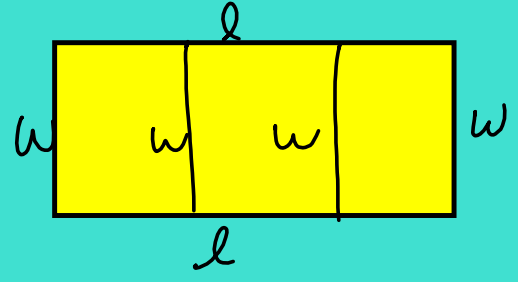
$\lim_{w \to 750} 1500w - 2w^2 = 0$

$l = 1500 - 2(375) = 750$

375' x 750'

1) Draw a picture & label with variables.
2) Write a formula for function to be maximized/minimized.
3) Write a 2nd formula, if 2 or more variables, for what is limiting the result.
4) Change func. to one variable.
5) Identify the interval for the variable in the func.
6) Find critical pts.
7) Test crit pts & end points for max/min.
8) Calculate & write final solution.

#2



$A = 303,750\ ft^2$

Outside = \$1/ft

Interior = \$0.5¢/ft

Minimize cost.

$C = \$1 \cdot (2w + 2l) + 0.5(2w)$

$= 2w + 2l + w$

$C = 3w + 2l$

$C = 3w + 2\left(\frac{303750}{w}\right)$

$\star\ C = 3w + \frac{607,500}{w}\ w^{-1}$

$C' = 3 + -\frac{607500}{w^2}$

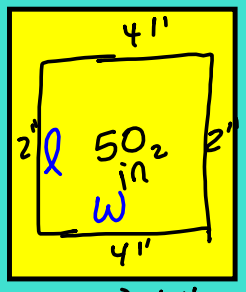
$lw = 303,750$

$l = \frac{303,750}{w}$

Interval for w

$(0, \infty)$

3/



$l+8$

$w+4$

$A=(l+8)(w+4)$ $lw=50$

$(0,\infty)$

$w=5$ $l=10$

Paper: 9" x 18"

4/ $C(x)=600+3x$

$R(x)=4x-0.0002x^2$

Profit = Revenue − Cost

$P=4x-0.0002x^2-(600+3x)$

$[1, 10{,}000]$

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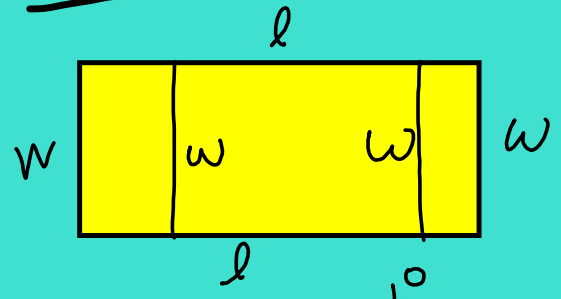

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$(0, 750)$

$1500 = 4w$

$375 = w$

$\lim_{w \to 0} 1500w - 2w^2 = 0$

$\lim_{w \to 750} 1500w - 2w^2 = 0$

$A(375) = 281{,}250$

375

$l = 1500 - 2(375) = 750$

375' x 750'

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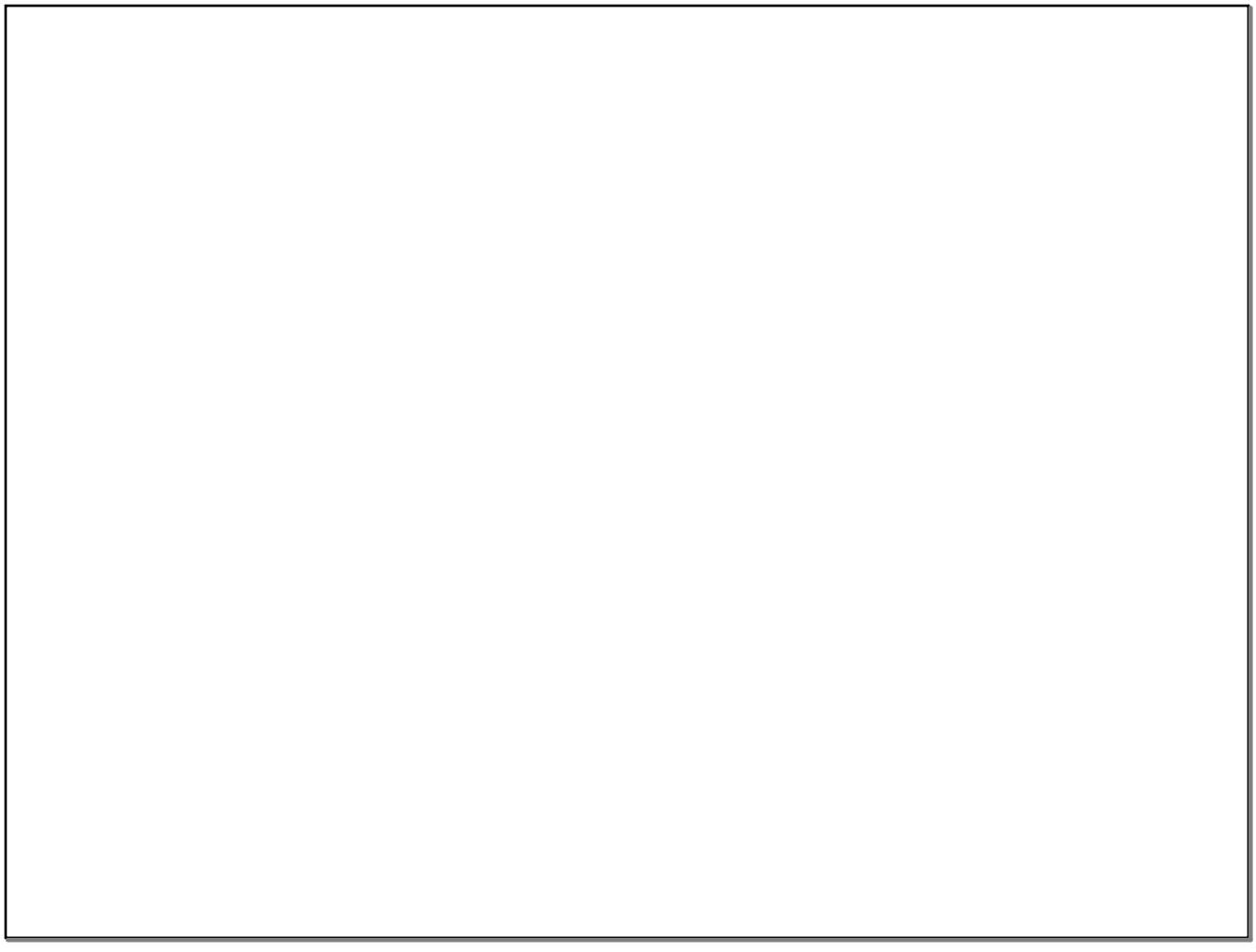
January 3, 2018