M4 5-7 Day 1 ANSWERS

Day 1 Ex 1.) $x + y = 18$ $P = xy$

System of equations

$x = 18 - y$

$P = (18-y)y = 18y - y^2$

Use substitution

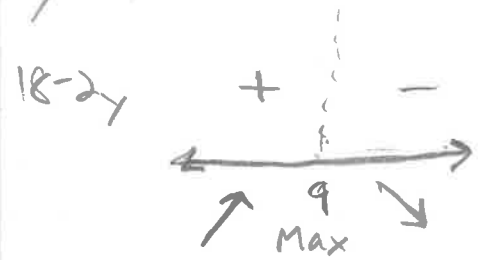
$\frac{dP}{dy} = P' = 18 - 2y$

$0 = 18 - 2y$

$y = 9$

Max/min occurs when the derivative = 0

Show that it is a max/min w/ NLA



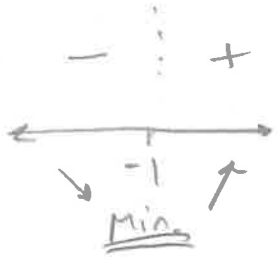
The two numbers are both 9.

Make sure you reread the question & actually answer it.

2.) $x^2 + 2x = S$

No system this time

$\frac{dS}{dx} = S' = 2x + 2$



$0 = 2x + 2$

$x = -1$

3.) $2L + 2w = 200$ $A = Lw$

$2L = 200 - 2w$

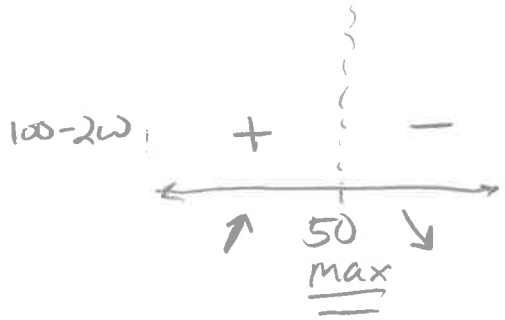
$L = 100 - w$

$A = (100 - w) \cdot w = 100w - w^2$

$\frac{dA}{dw} = A' = 100 - 2w$

$0 = 100 - 2w$

$w = 50$



The width is 50ft. & the length is 150ft.

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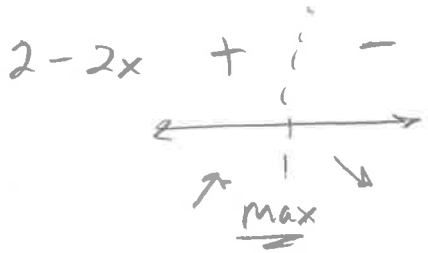
Day 1 HW

1.) $2x - x^2 = D$

$\frac{dD}{dx} = 2 - 2x$

$0 = 2 - 2x$

$\boxed{x = 1}$

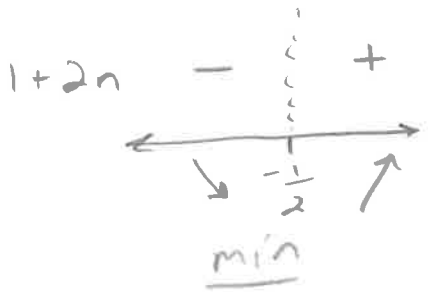


2.) $n + n^2 = S$

$\frac{dS}{dn} = 1 + 2n$

$0 = 1 + 2n$

$\boxed{n = -\frac{1}{2}}$

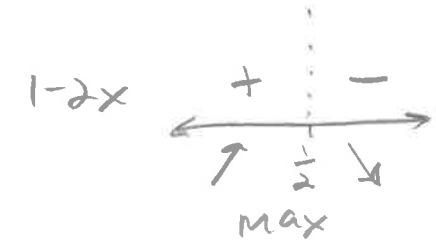


3.) $x - x^2 = D$

$\frac{dD}{dx} = 1 - 2x$

$0 = 1 - 2x$

$\boxed{x = \frac{1}{2}}$



4.) $x - y = 10$ $\quad P = x \cdot y$

$x = 10 + y$

$P = (10 + y)y = 10y + y^2$

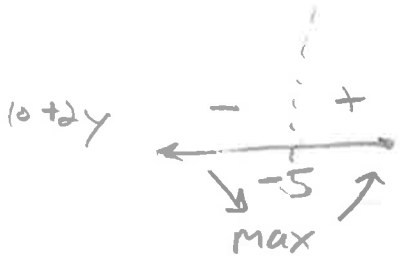
$\frac{dP}{dy} = 10 + 2y$

$0 = 10 + 2y$

$y = 5$

The #s are -5 & 5.

Since $5 - (-5) = 10$



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Day 1 HW (cont'd.)

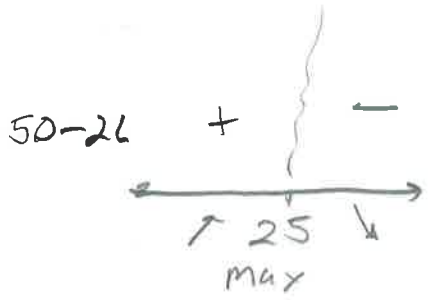
5.) $2w + 2L = 100$ $\quad A = wL$

$2w = 100 - 2L$

$w = 50 - L$

$A = (50-L)L = 50L - L^2$

$\frac{dA}{dL} = 50 - 2L$



$0 = 50 - 2L$

$L = 25$

Length is 25 ft & width is 25 ft.

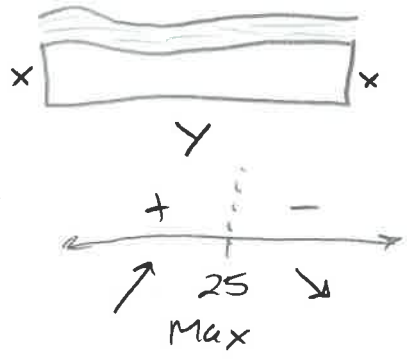
6.) $2x + y = 100$ $\quad A = xy$

$y = 100 - 2x$

$A = x(100-2x)$

$A = 100x - 2x^2$

$\frac{dA}{dx} = 100 - 4x$



$0 = 100 - 4x$

$x = 25$ $\quad y = 100 - 2(25) = 50$

25 ft by 50 ft