5. $P: X + 3y$ $\quad x + 3(192x^{-1})$

$S: xy = 192$ $\quad 0 = 1 - 576x^{-2}$

$\frac{xy}{x} = \frac{192}{x}$ $\quad \frac{576}{x^2} = 1$

$y = 192x^{-1}$ $\quad 576 = x^2$

$X = 24$

8. P: xy

S: $x^2+y=27$

$y=27-x^2$

$x=3$

$y=18$

$x(27-x^2)$

$27x-x^3$

$0=27-3x^2$

3.7B Optimization (Again)

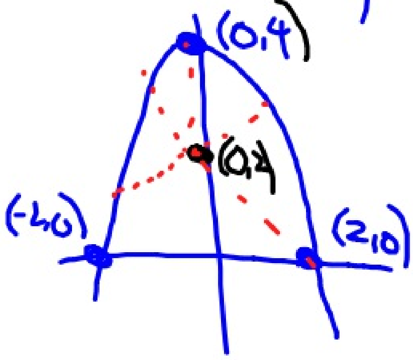
A. Distance

1. $d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

Ex Find the point on the graph of $y = 4 - x^2$ that is closest to $(0,2)$

$P: \sqrt{(x_2 - 0)^2 + (y_2 - 2)^2}$

$S: y = 4 - x^2$



$x^2 + (4 - x^2 - 2)^2$

$x^2 + (2 - x^2)^2$

$x^2 + 4 - 4x^2 + x^4$

$-3x^2 + x^4 + 4$

$0 = -6x + 4x^3$

$= 2x(2x^2 - 3)$

0

$2x^2 - 3 = 0$

$2x^2 = 3$

$x^2 = 3/2$

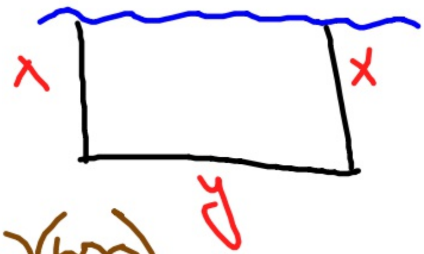
$x = \sqrt{3/2}$

$y = 4 - x^2$

$y = 4 - 0^2 = 4 \quad (0,4)$

$y = 4 - \left(\sqrt{\frac{3}{2}}\right)^2 = 2.5 \Rightarrow \left(\sqrt{\frac{3}{2}}, \frac{5}{2}\right)$

Ex. 2400 ft of fence to make a corral along a straight river. What is the biggest area possible?



P: xy

S: $2x+y=2400$

• $y=2400-2x \rightarrow 2400-2(600)$

$=1200$

$x(2400-2x)$

$2400x-2x^2$

$0=2400-4x$

$4x=2400$

$x=600$

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