

Optimization

- Find the point on the line $y = 6 - 2x$ that is closest to the origin.

$$y = -2x + 6 \rightarrow y = mx + b$$

$$0 = -2x + 6 \quad \text{the origin} = 0, 0$$

$$2x = 6$$

$$x = 3 \quad \text{x intercept}$$

objective formula

$$D^2 = x^2 + y^2 \quad d = \sqrt{x^2 + y^2}$$

$$d = \sqrt{x^2 + (6 - 2x)^2}$$

$$d = (x^2 + (6 - 2x)^2)^{1/2}$$

$$d' = \frac{1}{2} [x^2 + (6 - 2x)^2]^{-1/2} [2x + 2(6 - 2x)(-2)]$$

$$d' = \frac{2x - 4(6 - 2x)}{2\sqrt{x^2 + (6 - 2x)^2}} = 0 \quad \text{Set equal to 0 to find mins + maxs}$$

$$2x - 4(6 - 2x) = 0$$

$$2x - 24 + 8x = 0$$

$$\frac{10x}{10} = \frac{24}{10}$$

$$x = 2.4$$

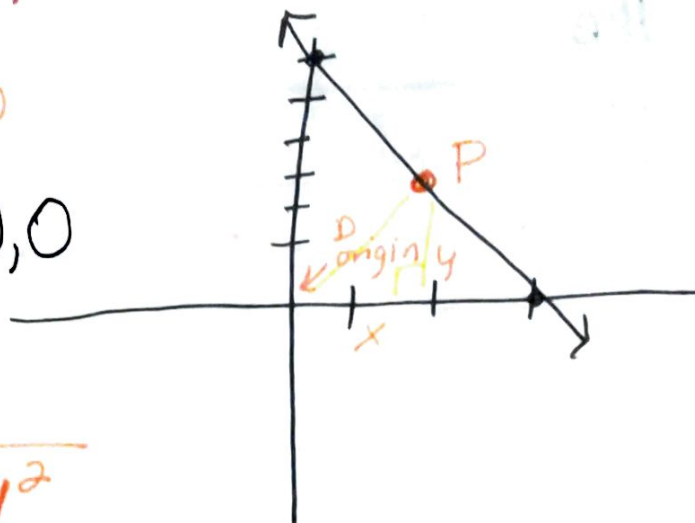
$$\begin{aligned} y &= 6 - 2x \\ y &= 6 - 2(2.4) \\ y &= 6 - 4.8 \\ y &= 1.2 \end{aligned}$$

$$\text{Point } (2.4, 1.2)$$

$x \qquad y$

$$D = \sqrt{2.4^2 + 1.2^2}$$

$$D = 2.683 \text{ units}$$



Preview from Notesale.co.uk
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