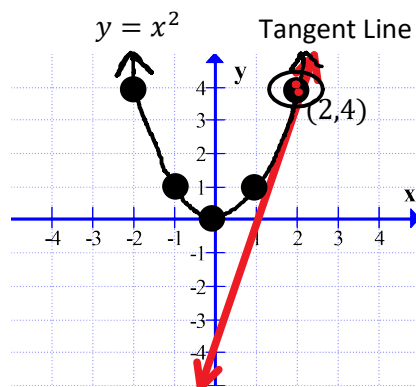


C12 - 2.9 - Eq.ofTan/Closest/ExtPt Derivatives Notes



$$y = x^2$$

$$y' = 2x$$

$$m = 2(2)$$

$$m = 4$$

$$x = 2$$

Check with math 8

$$y = x^2$$

$$y = (2)^2$$

$$y = 4$$

$$(2, 4)$$

$$y - y_1 = m(x - x_1)$$

$$y - 4 = 4(x - 2)$$

$$y - 4 = 4x - 8$$

$$y = 4x - 8 + 4$$

$$y = 4x - 4$$

$$4x - y - 4 = 0$$

$$y = mx + b$$

$$y = 4x + b$$

$$4 = 4(2) + b$$

$$b = -4$$

$$y = 4x - 4$$

Derivative
 $f'(a) = \text{slope}$
 $(y - \text{value}^*)$
 Tangent Equation

Parallel to $y = 2x - 4$

$$y = x^2$$

$$y' = 2x$$

$$m = 2$$

$$m = y'$$

$$2 = 2x$$

$$x = 1$$

$$y = x^2$$

$$y = (1)^2$$

$$y = 1$$

$$(1, 1)$$

Perpendicular $y = 2x - 4$

$$m = -\frac{1}{2}$$

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

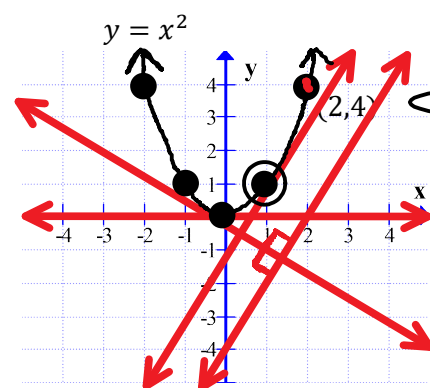
$$x = -\frac{1}{4}$$

$$y = x^2$$

$$y = \left(-\frac{1}{4}\right)^2$$

$$y = \frac{1}{16}$$

$$\left(-\frac{1}{4}, \frac{1}{16}\right)$$



$$y - y_1 = m(x - x_1)$$

$$y - 1 = 2(x - 1)$$

$$y = 2x - 1$$

$$y = 0$$

$$y + \frac{1}{16} = -\frac{1}{2}\left(x + \frac{1}{4}\right)$$

$$y = -\frac{1}{2}x - \frac{3}{16}$$

$$\left(-\frac{1}{2}, -\frac{1}{16}\right)$$

Horizontal

$$m = 0$$

$$y = x^2$$

$$y' = 2x$$

$$0 = 2x$$

$$x = 0$$

$$y = x^2$$

$$y = (0)^2$$

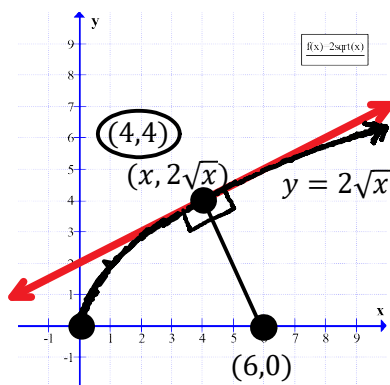
$$y = 0$$

$$(0, 0)$$

$$y - 0 = 0(x - 0)$$

$$y = 0$$

Eq* through pt on $2\sqrt{x}$ closest to the pt $(6, 0)$.



$$y = 2\sqrt{x}$$

$$y' = 2 \times \frac{1}{2} x^{-\frac{1}{2}}$$

$$y' = \frac{1}{\sqrt{x}}$$

$$m_{\perp} = -\sqrt{x}$$

$$y' = m$$

Derivative = Slope

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

$$m = \frac{y_2 - y_1}{2\sqrt{x} - 0}$$

$$-\sqrt{x} = \frac{x - 6}{2\sqrt{x}}$$

$$-x + 6 = \frac{x - 6}{\sqrt{x}}$$

$$-x + 6 = 2$$

$$x = 4$$

$$x \neq 0$$

$$m_{\perp} = -\sqrt{x}$$

$$m_{\perp} = -\sqrt{4}$$

$$m_{\perp} = -2$$

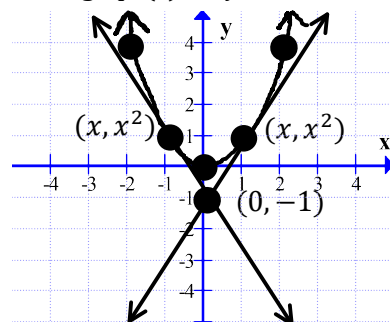
Or find the minimum distance.

$$y - 4 = -2(x - 4)$$

$$y = -2x + 12$$

$$2x + y - 12 = 0$$

Through pt(s) on $y = x^2$ exterior point $(0, -1)$



$$y = x^2$$

$$y' = 2x$$

$$y' = m$$

$$2x = \frac{y_2 - (-1)}{x_1 - 0}$$

$$2x = \frac{x^2 + 1}{x}$$

$$2x^2 = x^2 + 1$$

$$x^2 = 1$$

$$x = \pm 1$$

x	y	y'
-1	1	-2
1	1	+2

$$y - 1 = 2(x - 1)$$

$$y - 1 = -2(x + 1)$$