

Today:

- 2.2 (part 1)

Equations for tangent lines

- Understanding derivatives graphically.

Give an equation for the line with slope 3 going through (3, 4)

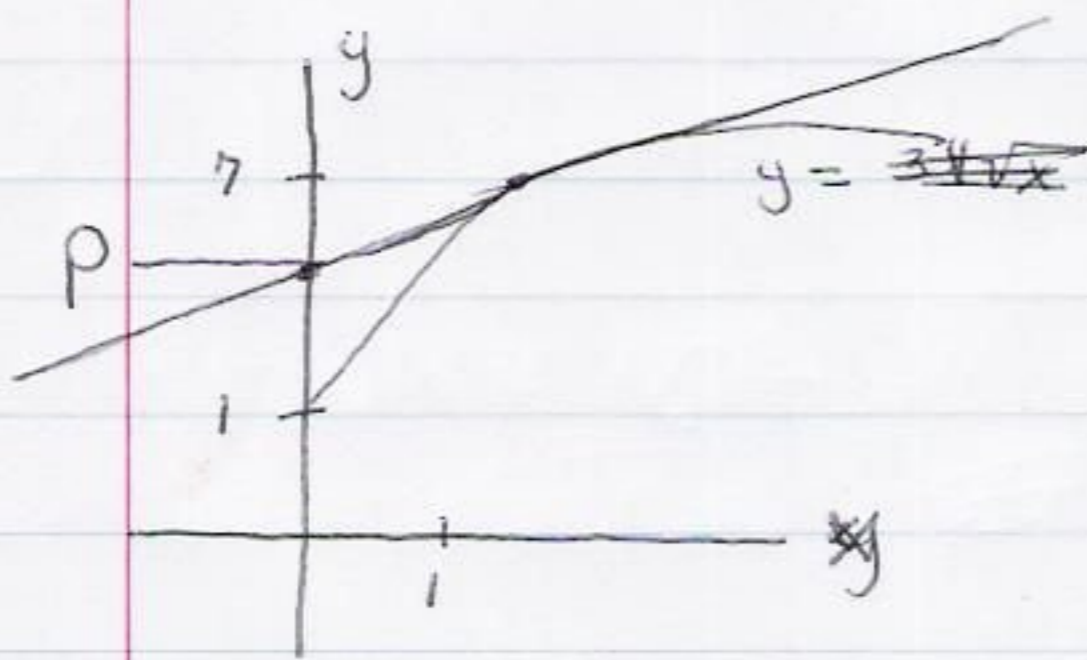
$$y - 4 = 3(x - 3)$$



$$y - b = m(x - a)$$

$$y - b = m(x - a)$$

Find an equation for the line tangent to the slope = $y' = 3 + 4\sqrt{x}$ at the point $(1, 7)$



what are the (x, y)

coordinates of p?

what is the equation for the tangent line?

$$\text{slope} = 2$$

$$y - 7 = 2(x - 1)$$

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

$$y' = (3 + 4\sqrt{x})'$$

$$y - 7 = 2(x - 1)$$

$$= 3' + 4(\sqrt{x})'$$

$$= 0 + 4\left(\frac{1}{2\sqrt{x}}\right) = \frac{4}{2\sqrt{x}} = \frac{2}{\sqrt{x}}$$

$$\text{at } x=1 \quad y' = \frac{2}{\sqrt{1}} = 2$$

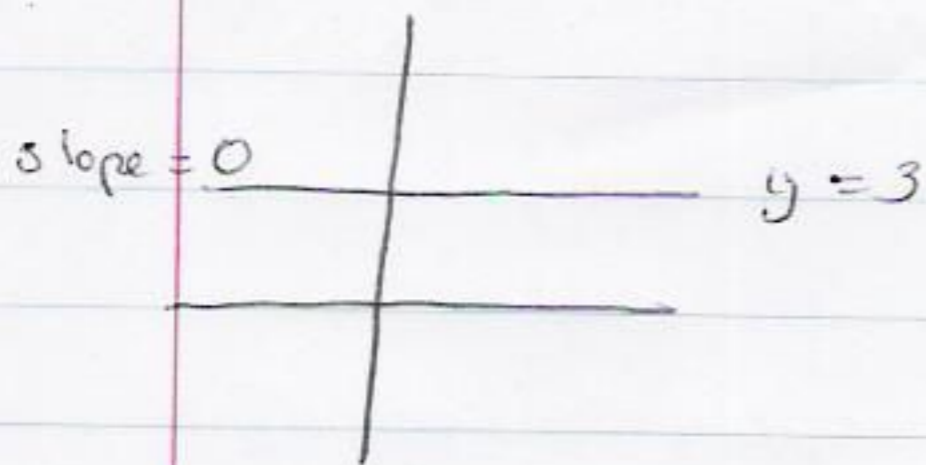
$$\left. \begin{aligned} \text{plug in } x=2(0-1) \\ y = 7 + 2(-1) - 5 \end{aligned} \right\} \Rightarrow x=0 \Rightarrow p=(0,5)$$

$$y = 5$$

Calculus I

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Constant Functions have derivative 0



$\sqrt{x}' = \frac{1}{\sqrt{2x}}$ was proved yesterday.

what is the x-intercept of that tangent line?

$$\begin{aligned} \text{set } y=0 \quad 0-7 &= 2(x-1) \Rightarrow -\frac{7}{2} = x-1 \Rightarrow -\frac{7}{2} + 1 = x \\ \Rightarrow -\frac{7}{2} + \frac{2}{2} &= x \Rightarrow x = -\frac{5}{2} \text{ and } y=0 \end{aligned}$$

Visualizing Derivatives

If $f'(a)$

Then, near $x=a$, $y=f(x)$ looks like.

Big, negative

small, negative

small, positive

big, positive