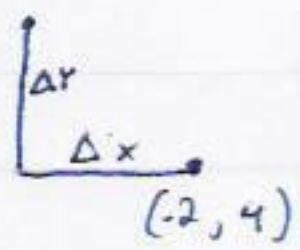
Notes 8-25-10

Today: 1.3 Lines
- Point slope
- 2 points
- slope, intercepts
- vertical

1.4 ?

Slope between two points is $\frac{\Delta y}{\Delta x}$

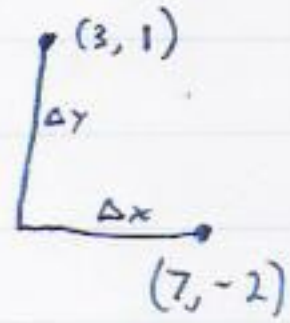
(3, 1)



$\Delta y = 4 - 1 = 3$

$\Delta x = -2 - 3 = -5$

$\frac{\Delta y}{\Delta x} = -\frac{3}{5}$ or $-.6$



$\frac{\Delta y}{\Delta x} = \frac{-2-1}{7-3} = -\frac{3}{4}$ or -0.75

$\frac{\Delta y}{\Delta x} = \frac{1-(-2)}{3-7} = -\frac{3}{4}$ or -0.75

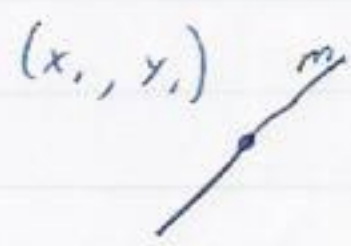
$\text{Slope} = \frac{\Delta x}{\Delta x} = \frac{y_2 - y_1}{x_2 - x_1}$ between points (x_1, y_1) and (x_2, y_2)

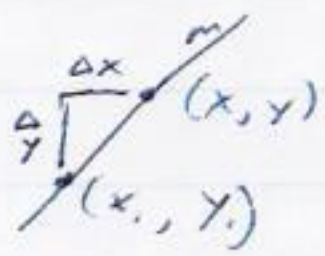
What is the slope between (2, 3) and (2, 8)?

$\frac{\Delta y}{\Delta x} = \frac{8-3}{2-2} = \frac{5}{0} =$ undefind slope

Point Slope formula: $y - y_1 = m(x - x_1)$

Given a slope m and point (x_1, y_1), there is exactly one line that has that slope and passes through that point.



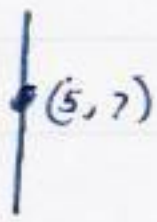


$$m = \frac{\Delta y}{\Delta x} = \frac{y - y_1}{x - x_1}$$

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

There is exactly one vertical line passing through a given point (x_1, y_1).

equation / formula: $x = x_1$



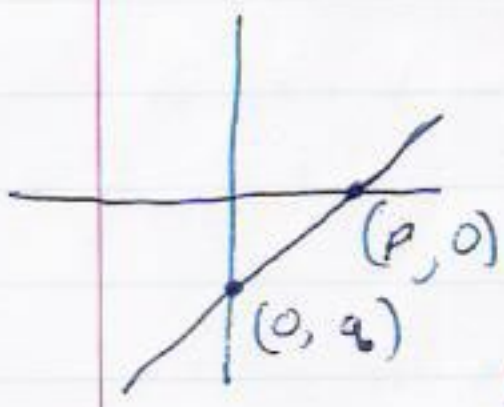
Given two different points (x_1, y_1) and (x_2, y_2), there is exactly one line passing through both.

Find the line going through $(2, 3)$ and $(-8, 0)$

- Find slope $m = \frac{\Delta y}{\Delta x} = \frac{0 - 3}{-8 - 2} = \frac{-3}{-10} = \frac{3}{10} = .3$

$y - 3 = .3(x - 2) \iff y - 3 = 0.3x - 0.6 \iff y = 0.3x + 2.4$

$y - 0 = .3(x - (-8)) \iff y = 0.3x + 2.4$



p = x-intercept

q = y-intercept

$y - 4 = 2(x - 3)$

What is the x-intercept?, y-intercept?

x-intercept = make y = to 0 : $0 - 4 = 2(x - 3)$ → $x = 1$

y-intercept = make x = to 0 : $y - 4 = 2(0 - 3)$

$\hookrightarrow = -2$

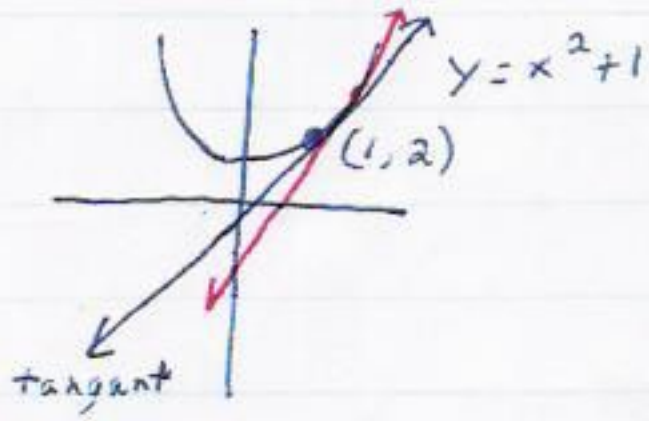
Remark: for $y = mx + b$, the y-intercept is just b : $y = m \cdot 0 + b = b$

the x-intercept is $-b/m$:

$0 = mx + b$

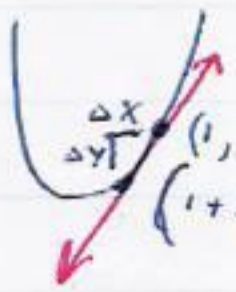
$-b = mx$

$-b/m = x$



Let Δx be a small number,

Pick the point $(1+\Delta x,\ 2+2\Delta x+\Delta x^2)$



$= (1+\Delta x,\ 2+2\Delta x+\Delta x^2)$

$(a+b)^2 = a^2 + 2ab + b^2$

$\frac{\Delta y}{\Delta x} =$ $\quad \Delta y = (2+2\Delta x+\Delta x^2) - 2 = 2\Delta x + \Delta x^2$

$\Delta x = (1+\Delta x) - 1 = \Delta x$

$$\frac{\Delta y}{\Delta x} = \frac{2\Delta x + \Delta x^2}{\Delta x} = \frac{\Delta x\,(2+\Delta x)}{\Delta x}$$

As long as $\Delta x \neq 0$ you can cancel

$$\frac{\Delta y}{\Delta x} = 2 + \Delta x$$

To get $(1+\Delta x, 2+2\Delta x+\Delta x^2)$ closer to $(1,2)$ you make Δx closer to 0. If Δx gets closer to 0, then $2+\Delta x$ gets closer to 2.