Note Title 2/5/2015

From RR 13

Review:

$$-3x+2y=-12$$

Find x-intercept: Set $y=0$

$y=0$ $\quad -3x+2(0)=-12$

$$-3x+0=-12$$
$$-3x=-12$$
$$\frac{-3x}{-3}=\frac{-12}{-3}$$
$$x=4$$

$(4,0)$

Find y-intercept: Set $x=0$

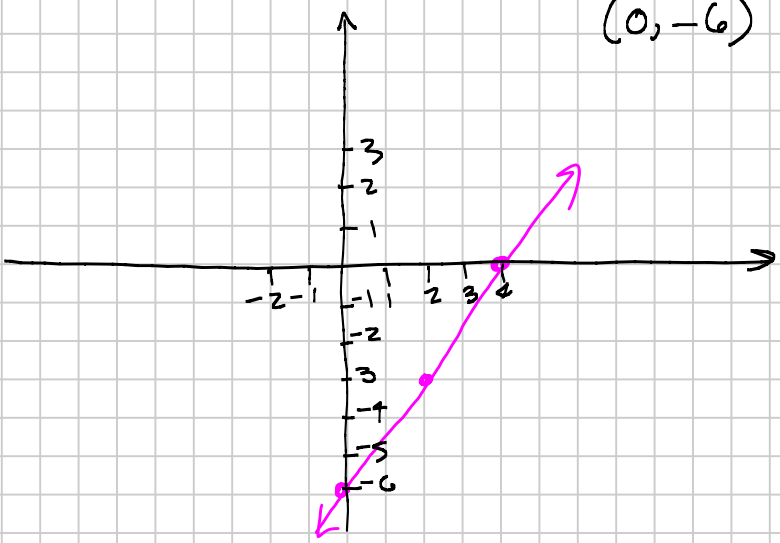
$x=0$ $\quad -3(0)+2y=-12$

$$2y=-12$$
$$\frac{2y}{2}=\frac{-12}{2}$$
$$y=-6$$

$(0,-6)$

x-intercept: $(4,0)$ or 4

y-intercept: $(0,-6)$ or -6



$$-3x+2y=-12$$

$x=2$ $\quad -3(2)+2y=-12$

$$-6+2y=-12$$
$$+6 \qquad +6$$
$$2y=-6$$
$$\frac{2y}{2}=\frac{-6}{2}$$
$$y=-3$$

$(2,-3)$

(b) $x=-3y$

Find x-intercept: Set $y=0$

$y=0$ $\quad x=-3(0)$

$$x=0$$

$(0,0)$

x-intercept: $(0,0)$

y-intercept: $(0,0)$

Find y-intercept: Set $x=0$

$x=0$ $\quad 0=-3y$

$$\frac{0}{-3}=\frac{-3y}{-3}$$
$$0=y$$

$(0,0)$

Find more points:

$x=2$ $\quad 2=-3y$

$$\frac{2}{-3}=\frac{-3y}{-3}$$
$$-\frac{2}{3}=y$$

$\left(2,-\frac{2}{3}\right)$

$x=6$ $\quad 6=-3y$

$$\frac{6}{-3}=\frac{-3y}{-3}$$
$$-2=y$$

$(6,-2)$

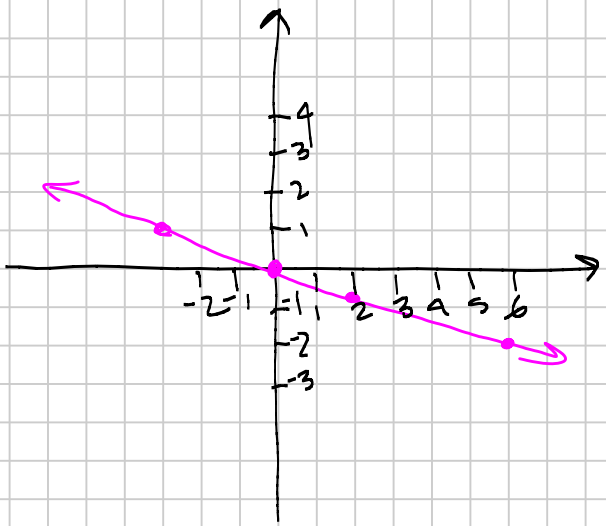
$x=-3$ $\quad -3=-3y$

$$\frac{-3}{-3}=\frac{-3y}{-3}$$
$$1=y$$

$(-3,1)$

See next page

⑥ cont'd:



$(0,0)$

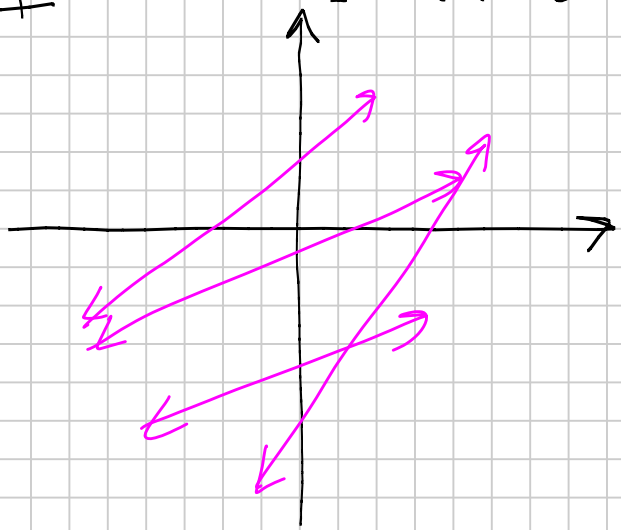
$(2,-\frac{2}{3})$

$(-3,1)$

$(6,-2)$

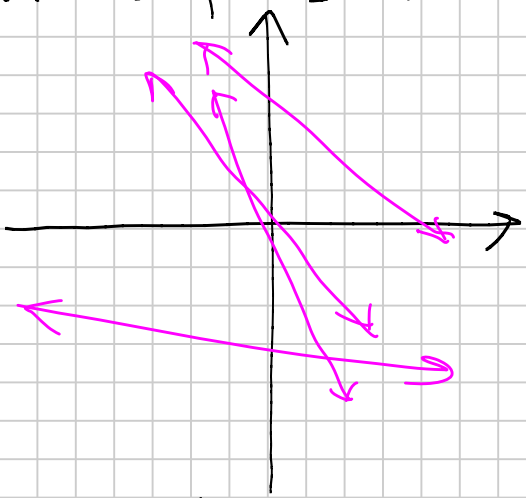
3.3: Slope of a Line

Slope: measures the direction and steepness of a line



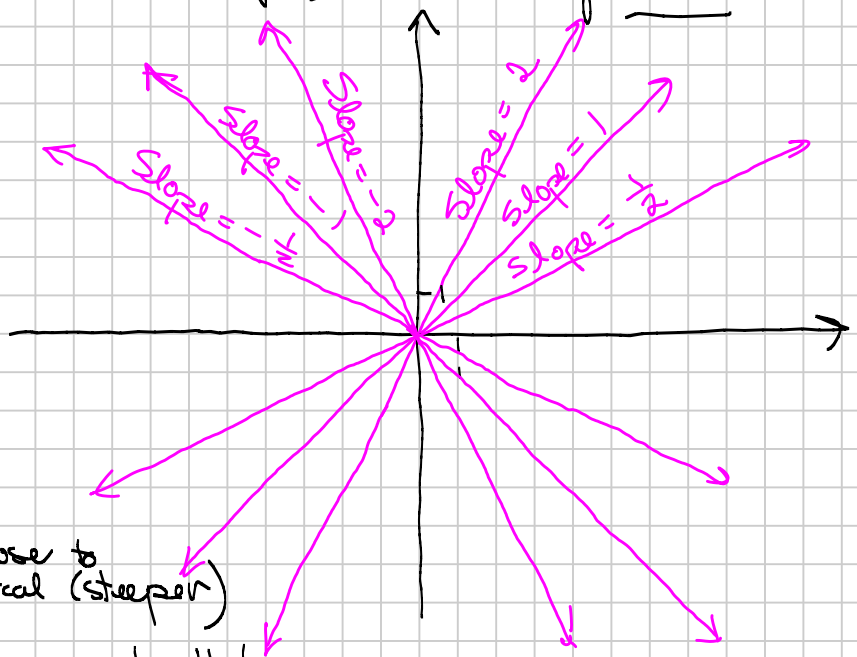
Positive Slopes

(go uphill from left to right)



Negative Slopes

(go downhill from left to right)



For positive slopes, larger slope ⇒ closer to vertical (steeper)

For negative slopes, note that

$$-2 < -1$$

Definition: The slope of a line is $m = \frac{y_2 - y_1}{x_2 - x_1}$, where (x_1, y_1) and (x_2, y_2) are points on the line.

$$\text{Slope} = \frac{\text{vertical change}}{\text{horizontal change}} = \text{“}\frac{\text{Rise}}{\text{Run}}\text{”}$$

3.3.2

Example: Graph the line that passes through the point $(1, -3)$ and has slope $\frac{2}{3}$.

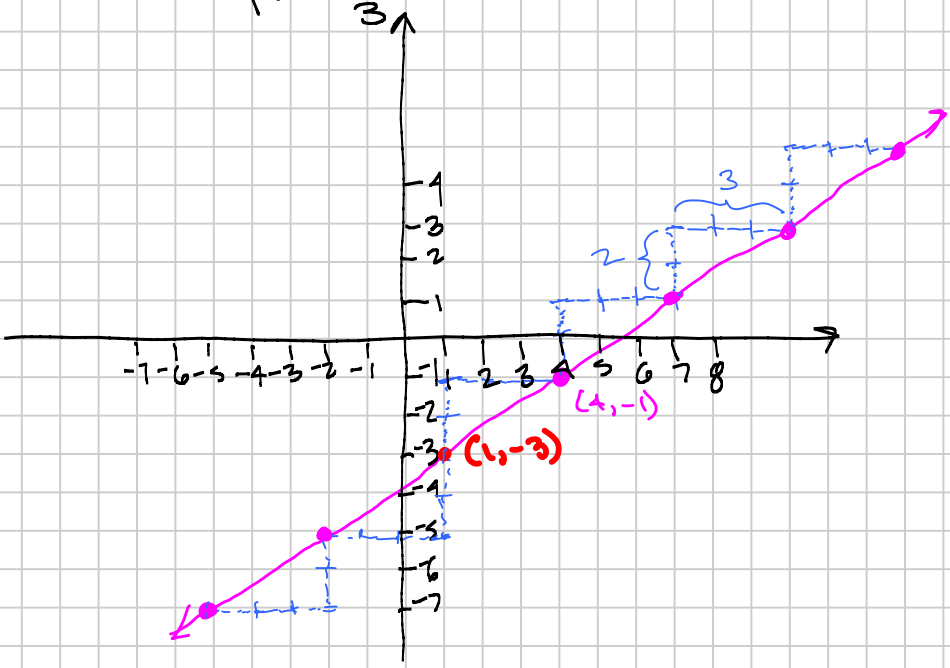
Slope: $m = +\frac{2}{3}$

↗ +

$\frac{\text{Rise}}{\text{Run}} = +\frac{2}{3}$

Rise = vertical change = 2

Run = horizontal change = 3



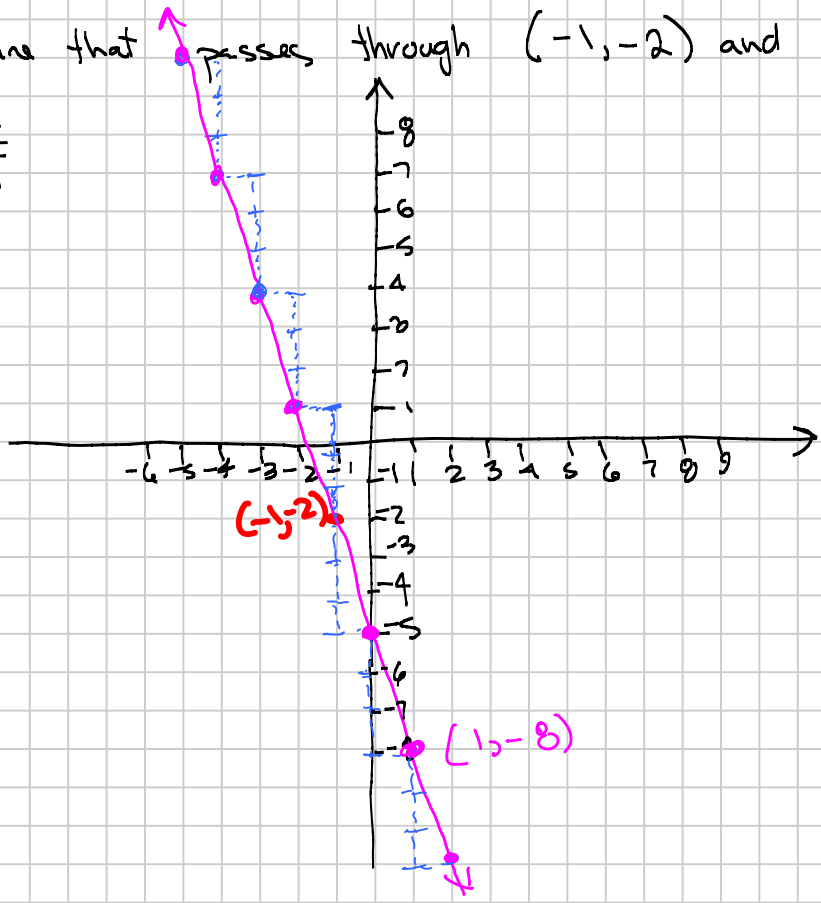
Example: Graph the line that passes through $(-1, -2)$ and has slope -3.

Slope: $m = -3 = -\frac{3}{1} = \frac{\text{RISE}}{\text{RUN}}$

rise = vertical change = 3

run = horizontal change = 1

↘ −



Calculating the slope given 2 points

3.3.3

Def'n: Slope is $m = \frac{y_2 - y_1}{x_2 - x_1}$, where (x_1, y_1) and (x_2, y_2) are points on the line.

Ex: Find the slope of the line containing the points $(-3, 2)$ and $(5, 8)$.

Let $(x_1, y_1) = (-3, 2)$

$(x_2, y_2) = (5, 8)$

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{8 - 2}{5 - (-3)}$$

$$= \frac{6}{5+3} = \frac{6}{8} = \frac{3}{4}$$

Slope: $m = \frac{3}{4}$

Ex: Find the slope of the line containing the points $(4, -6)$ and $(-1, -3)$.

x_1 y_1 x_2 y_2

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{-3 - (-6)}{-1 - 4} = \frac{-3+6}{-5} = \frac{3}{-5} = -\frac{3}{5}$$

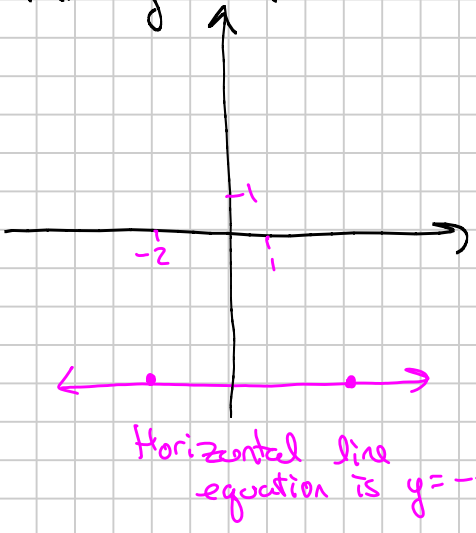
Slope: $m = -\frac{3}{5}$

Ex: Find the slope of the line containing the points $(3, -4)$ and $(-2, -4)$

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{-4 - (-4)}{-2 - 3}$$

$$= \frac{-4+4}{-5} = \frac{0}{-5} = 0$$

Slope: $m = 0$



Horizontal line equation is $y = -4$

Ex: Find the slope of the line containing the points $(5,1)$ and $(5,3)$.

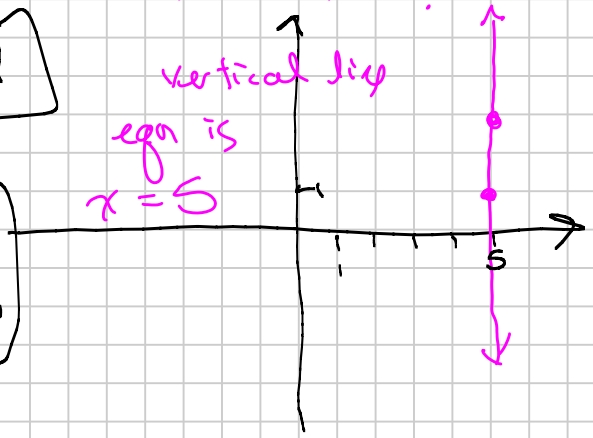
$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{3-1}{5-5} = \frac{2}{0}$$

Division by 0 is undefined!

Slope is undefined

vertical line

eqn is $x = 5$



All vertical lines have undefined slope.

All horizontal lines have 0 slope.