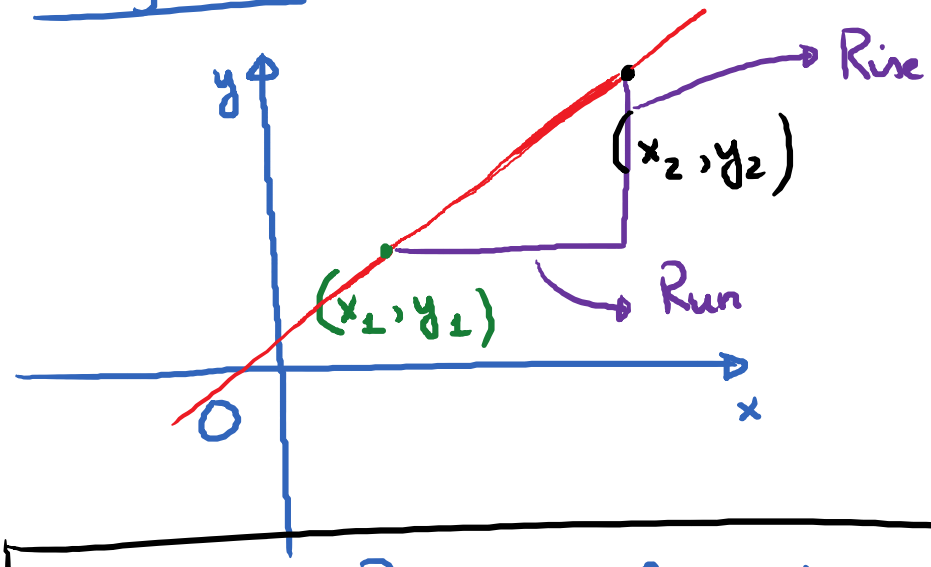
2.3. Linear Functions and Slope.

Thursday, September 28, 2017 9:52 AM

Obj #1: Calculate a line's slope



$$\frac{\text{Rise}}{\text{Run}} = \text{Slope}$$

$$\text{Slope} = \frac{\text{Rise}}{\text{Run}} = \frac{\text{Change in } y}{\text{Change in } x} = \frac{y_2 - y_1}{x_2 - x_1};$$

(assume $x_1 \neq x_2$)

E.g. Find the slope of the line passing through the given points:

(a) $(4, -2)$; $(-1, 5)$. (x_1, y_1 ; x_2, y_2)

$$\text{Slope} = \frac{y_2 - y_1}{x_2 - x_1} = \frac{5 - (-2)}{-1 - 4} = \frac{7}{-5} = \boxed{-\frac{7}{5}}$$

(b) $(-2, 1)$; $(2, 2)$ (x_1, y_1 ; x_2, y_2)

$$\text{Slope} = \frac{2 - 1}{2 - (-2)} = \boxed{\frac{1}{4}}$$

Obj 2: Write the point-slope form of the equation of a line

For a nonvertical line, if m is the slope and the line passes through the point (x_1, y_1), then the point-slope form of the line is:

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

E.g. Write an equation in point-slope form for the line with slope 6 and passes through the point $(\overset{x_1}{2}, \overset{y_1}{-5})$.

$m = 6$; $x_1 = 2$; $y_1 = -5$.

Point-Slope form of the line is:

$$y - (-5) = 6(x - 2)$$

$$y + 5 = 6(x - 2)$$

Solve for y in terms of x

$$y = 6(x-2) - 5$$

$$y = 6x - 12 - 5 \; ; \quad \boxed{y = 6x - 17}$$

Slope – intercept form

E.g. Write the point-slope form of the line that passes through the points $(-3, -1)$ and $(2, 4)$.

(x_1, y_1 = $(-3, -1)$; x_2, y_2 = $(2, 4)$)

$$\text{Slope} = \frac{y_2 - y_1}{x_2 - x_1} = \frac{4 - (-1)}{2 - (-3)} = \frac{5}{5} = \boxed{1}$$

Point-Slope form: $y - (-1) = 1 \cdot (x - (-3))$

$$\boxed{y + 1 = x + 3}$$

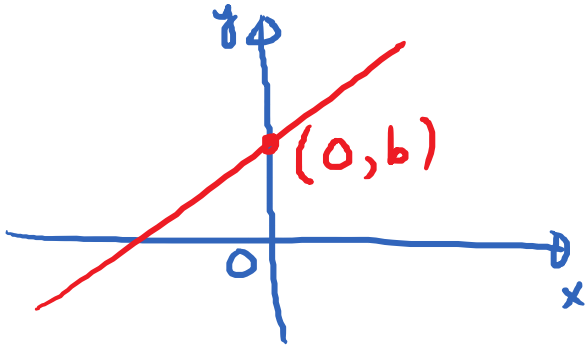
Slope-intercept form: $\boxed{y = x + 2}$

Obj #3: Graph the equation in slope-intercept form of a line

The slope intercept form of a non vertical line with slope m and y-intercept $(0,b)$ is the equation $y = mx + b$

m → slope

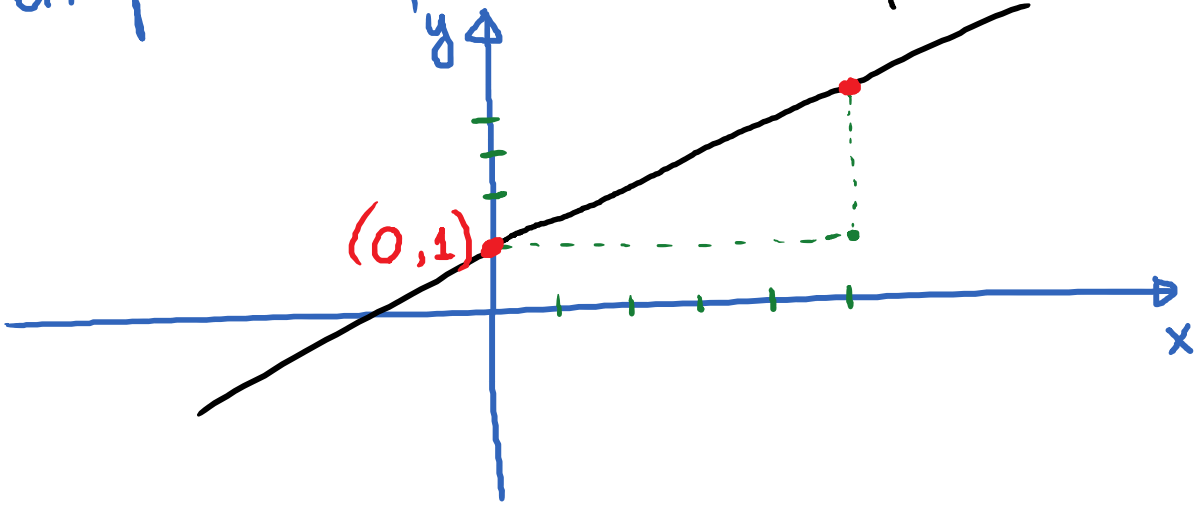
b → y-part of the y intercept



E.g. $y = \frac{3}{5}x + 1$

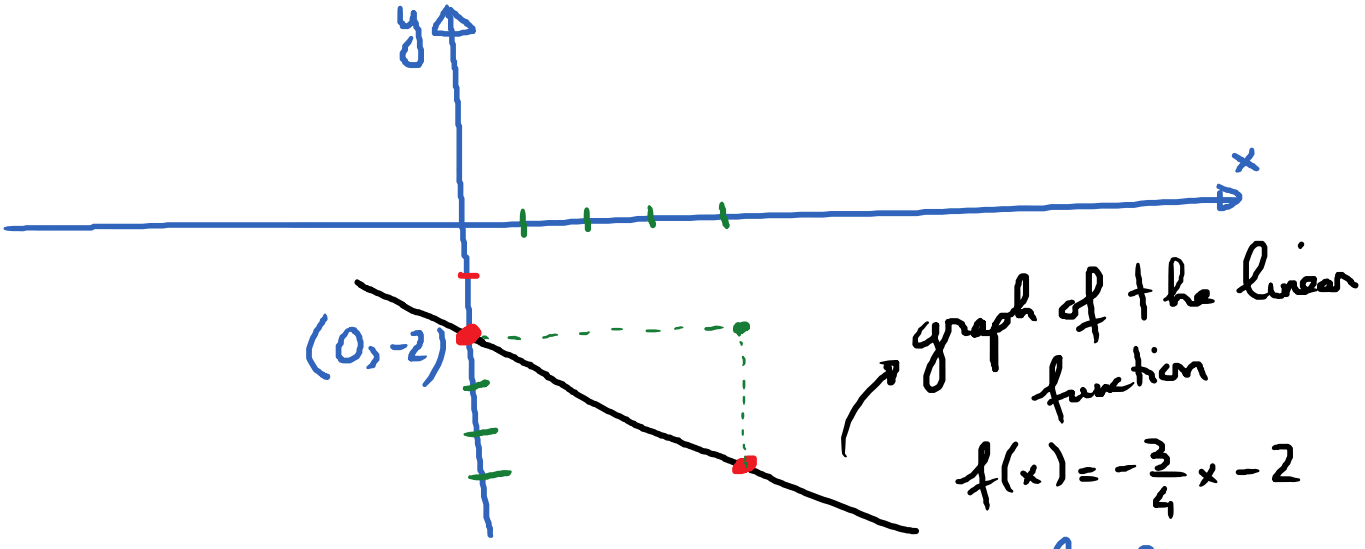
Graph this function.

graph of the linear function $y = \frac{3}{5}x + 1$



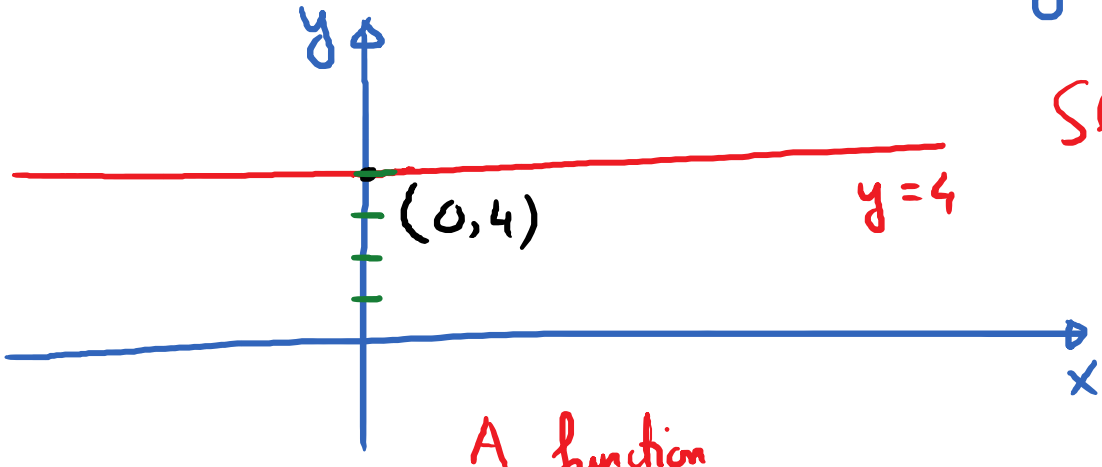
E.g. Graph the linear function

$$f(x) = -\frac{3}{4}x - 2$$



Obj #4: Graph Horizontal and Vertical lines

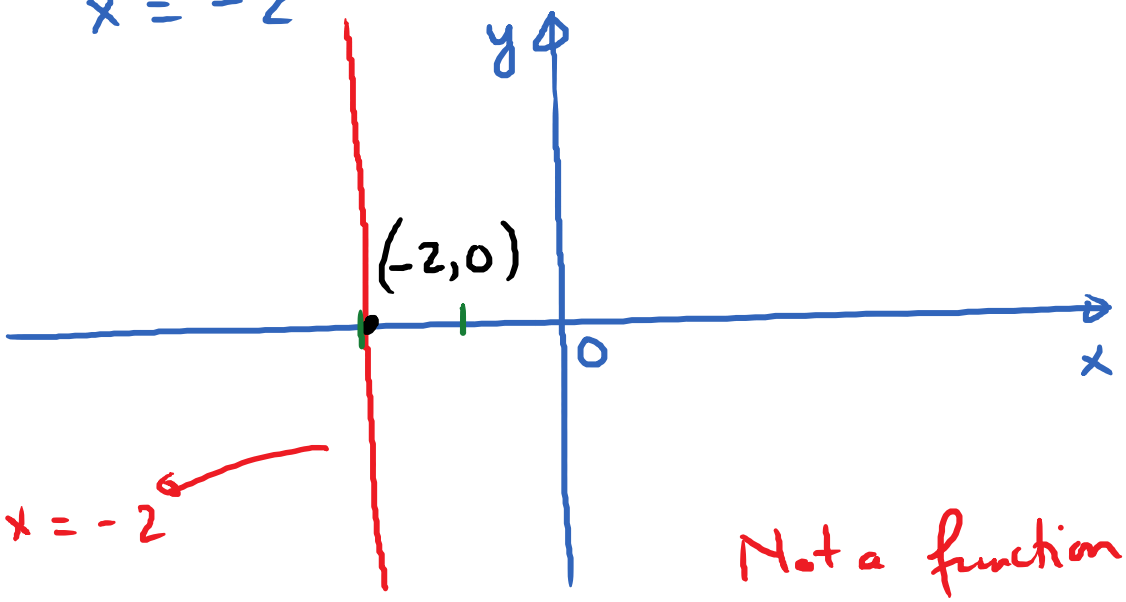
E.g. $y = 4$. The equation of a horizontal line that passes through $(0,4)$ on the y-axis



Slope = 0

A function

E.g. $x = -2$



Not a function