The equation $y = b$ is the equation of a horizontal line which passes through the point $(0, b)$ on the y-axis. The slope of this line is zero.

The equation $x = a$ is the equation of a vertical line which passes through the point $(a, 0)$ on the x-axis. The slope of this line is undefined

Obj #5: General Form of the equation of a line

Every line has an equation that can be written in general form as

$$Ax + By + C = 0$$

where A, B, C are constants and A, B are not both zero.

E.g. Given the equation

$$3x + 6y - 12 = 0$$

Find slope and the y-intercept of the line whose general equation is the above.

Goal: get to the slope-intercept form $\longrightarrow$ get y by itself:

$$6y = -3x + 12$$

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

$$y = -\frac{1}{2}x + 2.$$

Slope $= -\frac{1}{2}$; y-intercept $= (0, 2)$

Note: What if we just need the y-intercept and we don't want to go through the work to get y by itself.

$$3x + 6y - 12 = 0$$

Goal: get y-intercept?

Plug $x = 0$ into the equation:

$$6y - 12 = 0$$

$$y = 2$$

y-intercept: $(0, 2)$

Goal: get x-intercept?

Plug $y = 0$ into the equation:

$$3x - 12 = 0$$

$$x = 4.$$

x-intercept: $(4, 0)$

Summary: Given the equation in general form of a line: $Ax + By + C = 0$

To find y-intercept: plug $x = 0$ into the equation.

To find x-intercept plug $y = 0$ into the equation.

E.g. Graph the equation $3x - 2y - 6 = 0$ using the intercepts.

x-intercept: Plug $y = 0$: $3x - 6 = 0$

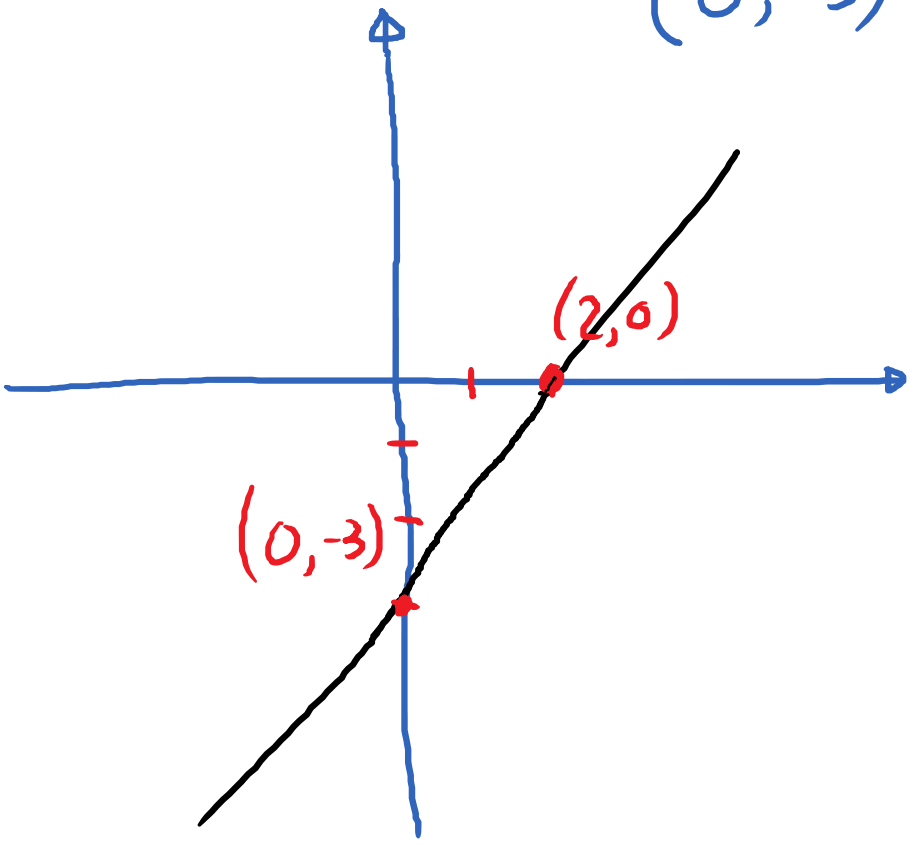
$x = 2$

$(2, 0)$

y-intercept: Plug $x = 0$: $-2y - 6 = 0$

$y = -3$

$(0, -3)$



HW #18

(a) $\text{Slope} = \frac{14-16}{14-6} = \frac{-2}{8} = -\frac{1}{4}$.

$$y - 16 = -\frac{1}{4}(x-6)$$

(b) $$y = -\frac{1}{4}(x-6) + 16$$

$$y = -\frac{1}{4}x + \frac{3}{2} + 16 = -\frac{1}{4}x + \frac{3+32}{2}$$

$$y = -\frac{1}{4}x + \frac{35}{2}.$$

$$f(x) = -\frac{1}{4}x + \frac{35}{2}.$$

(c) Year: 2007 $\longrightarrow$ $x = 20$

(20 years after 1987).

$$f(20) = -\frac{1}{4} \cdot 20 + \frac{35}{2} = \frac{25}{2} = 12.5$$