

A Review of Linear Equations

Standard 1c

Recall that there are four kinds of linear equations

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

$$y = mx + b$$

Slope-Intercept: The most commonly used one in which m = slope and b = y -intercept

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

Point-Slope: The one that I recommend most because it only requires the slope and one point anywhere on the line

$$Ax + By = C$$

Standard Form: Can be converted to slope-intercept form with

$$m = -\frac{A}{B} \quad b = \frac{C}{B}$$

$$\frac{x}{a} + \frac{y}{b} = 1$$

Intercept Form: In which the x -intercept is a and the y -intercept is b

Write all four equations of the line through the points (0, 2) and (-3, -4)

$$y = mx + b \quad m = \frac{2 - (-4)}{0 - (-3)} = \frac{6}{3} = \frac{2}{1} \quad 2 = 2 * 0 + b \quad b = 2$$

$$y = 2x + 2$$

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

$$y - 2 = 2(x - 0)$$

or

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

$$Ax + By = C$$

Since we already have the slope intercept form of this line we can just use algebra

$$-2x + y = 2$$

or

$$2x - y = -2$$

$$y = 2x + 2 \longrightarrow -2x + y = 2$$

$$y = 2x + 2 \longrightarrow 0 = 2x - y + 2 \longrightarrow -2 = 2x - y$$

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$$\frac{x}{a} + \frac{y}{b} = 1$$

We know that $b = 2$ so we'll plug in (-3, -4)

$$\frac{-3}{a} + \frac{-4}{2} = 1 \quad a = -1$$

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

Find an equation of the line perpendicular to this line that intersects it at $(-3, -4)$

$$y = 2x + 2$$

$$m_{\perp} = -\frac{1}{m}$$

Recall that the slopes of perpendicular lines are negative reciprocals of each other

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

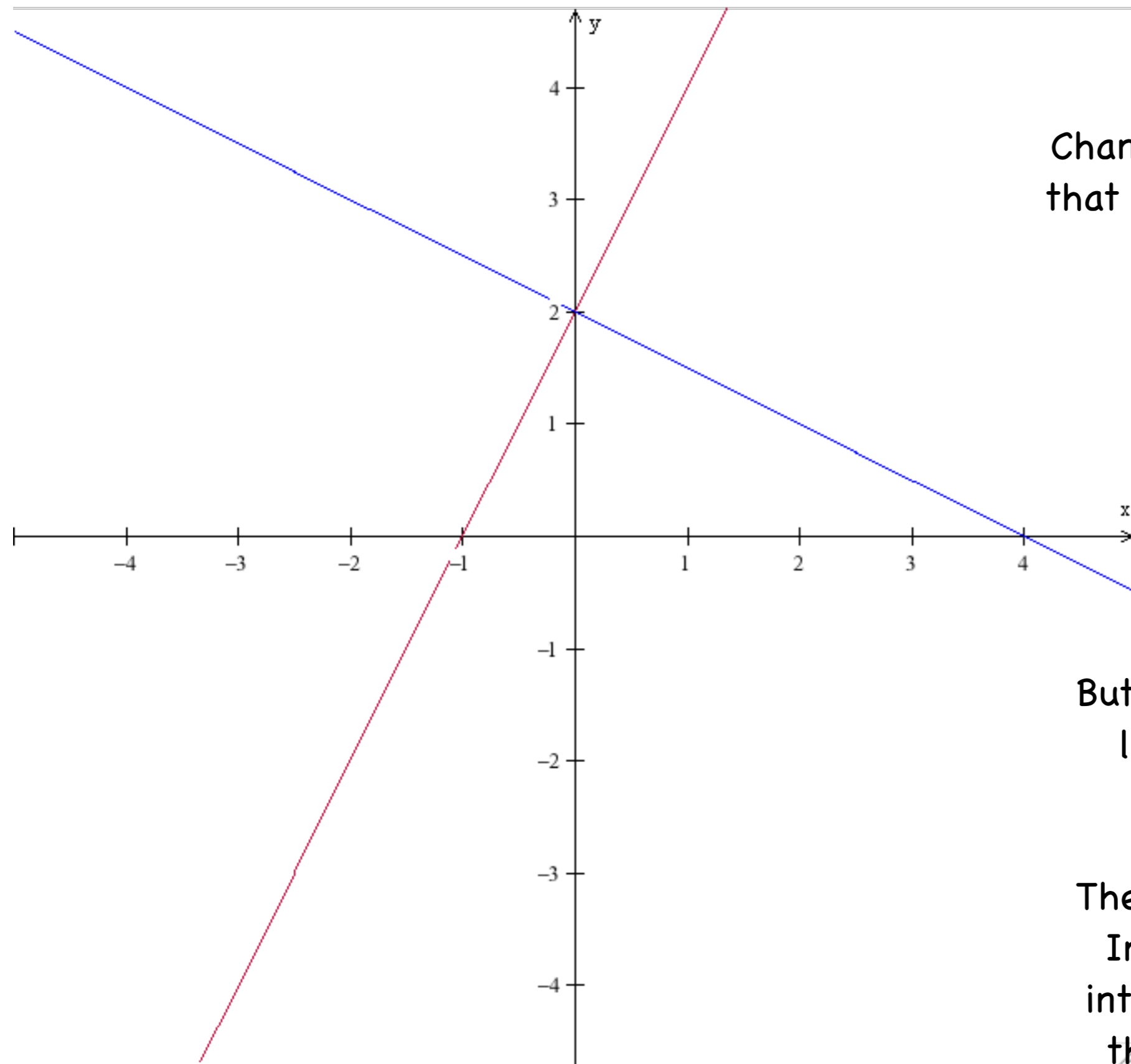
$$y + 4 = 2(x + 3)$$

This equation would simply be rewritten as

$$y + 4 = -\frac{1}{2}(x + 3)$$

Be careful not to do the same thing with slope intercept.

Why?



$$y = 2x + 2$$

Changing only the slope assumes that the two lines have the same y-intercept

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

But the problem states that both lines pass through the point $(-3, -4)$

The second line does not do that. In order to do this with slope intercept we would need to find the y-intercept of the second line.

Finally, and this is kind of a big deal:

$$y = f(x)$$

Many forget that $f(x)$ is an expression of y meaning for example that $f(2)$ means find the value of y when $x = 2$

Function notation will occur more and more in this class. You will see why as the year goes along.