

# MA 109: September 7

Linear Functions: Slope and Equations

## Start of Class

### Instructor Information

Name:

Email:

Office Hours:

## Warm-up Questions

## Notes

### Computing Slope

The slope of the line between the points  $(x_1, y_1)$  and  $(x_2, y_2)$  is

$$m = \frac{y_2 - y_1}{x_2 - x_1} \quad \text{which is the same as} \quad \frac{y_1 - y_2}{x_1 - x_2}$$

**Example:** Compute the slope of the line between the points  $(0, 5)$  and  $(3, -4)$ .

$x_1 \ y_1 \ x_2 \ y_2$

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{-4 - 5}{3 - 0} = \frac{-9}{3} = \boxed{-3}$$

What if we flip the order?

$$m = \frac{y_1 - y_2}{x_1 - x_2} = \frac{5 - (-4)}{0 - 3} = \frac{5 + 4}{-3} = \frac{9}{-3} = \boxed{-3}$$

same as before!

## Writing Equations of Linear Functions

Step 1: use the template  $f(x) = mx + b$ , where  $m$  is slope

Step 2: plug in slope for  $m$

Step 3: plug in a given point for  $x$  and  $y$  to solve for  $b$

Example: Write the equation of the line with slope  $-3$  and goes through the point  $(2, 5)$ .

$$\textcircled{1} f(x) = mx + b$$

$$\textcircled{2} f(x) = -3x + b$$

$$\begin{aligned} \textcircled{3} 5 &= -3(2) + b \\ 5 &= -6 + b \\ 11 &= b \end{aligned}$$

$$f(x) = -3x + 11$$

What about y-intercepts?

If you are given the y-intercept, that gives you  $b$ .  
But you don't need to memorize this shortcut. The strategy above will always work.

Example: Write the equation of the line with slope  $5$  and y-intercept  $(0, 7)$ .

$$\textcircled{1} f(x) = mx + b$$

$$\textcircled{2} f(x) = 5x + b$$

$$\textcircled{3} 7 = 5(0) + b$$

$$7 = 0 + b$$

$$7 = b$$

$$f(x) = 5x + 7$$

## End of Class

Write a summary of what you learned today:

What questions do you have about the material from today?

What do you need to do between now and the next class meeting?