

Session 2.2

Mr. Hernandez: josehdz@cs.stanford.edu

Recap of last week

Make sure you have these things in your notes, because I will refer to them with the expectation that you have learned, memorized, or written them down.

1. Understanding the slope

- (a) Definition: $\text{slope} = \frac{\text{rise}}{\text{run}} = \frac{y_2 - y_1}{x_2 - x_1}$
- (b) Positive slope is up/right movement and negative slope is down/right movement
- (c) Slope can be any real number, but more easily interpreted as a rational number (fraction)

2. Slope-intercept form is $y = mx + b$

- (a) m is the slope
- (b) b is the y -intercept, which is where the line crosses the y -axis
- (c) This is one of the most convenient forms to graph!

Main problems

1. Find the (x, y) point on each line for the specified variable value of x .

- (a) $y = \frac{4}{5}x - 10$ where $x = 3$
- (b) $y = -\frac{5}{3}x + 2$ where $x = -3$
- (c) $y = \left| x - \frac{17}{31} \right|$ where $x = 0$
- (d) $y = |x + 4|$ where $x = -5$
- (e) $y = |x - 5| + 7$ where $x = -5$
- (f) $y = x^2 + x - 6$ where $x = -3$
- (g) $y = 2x^2 - x - 10$ where $x = -2$
- (h) $y = (x - 13)(x + 2)(x + 7)$ where $x = -2$

2. Find the slope between the two points and then find a third point with integer coordinates. *Extra:* find the equation of the line containing both points.

- (a) $(-1, -2), (1, 2)$
- (b) $(5, 8), (7, 11)$
- (c) $(0, 2), (3, -10)$
- (d) $(2, 1), (6, 9)$
- (e) $(2, 0), (-2, -2)$
- (f) $(3, -4), (-5, 8)$

3. Graph each of the following lines, identify their slopes, and label the y -intercept on the graph. *Extra:* label the x -intercept too (where line crosses x -axis).

- (a) $y = -\frac{3}{2}x + 2$
- (b) $y = \frac{5}{3}x - 2$
- (c) $y = \frac{7}{6}x - \frac{3}{2}$
- (d) $y = 2x - 6$

4. Denote all possible values of x . Use a number line if you find it more convenient

(a) $|x| \leq 3$

(d) $|x - 3| \leq 5$

(b) $\left|\frac{x}{3}\right| \geq 4$

(e) $|x + 3| \geq 2$

(c) $|3x| \leq 6$

(f) $|x - 2| + 3 \leq 3$

5. Plot each of these equations on the same graph. *Extra:* find the (x, y) point that satisfies both equations.

(a)
$$\begin{cases} 4x + y = 8 \\ 5x + 2y = 13 \end{cases}$$

(d)
$$\begin{cases} 2x + 2y = 4 \\ -3x + 5y = 6 \end{cases}$$

(b)
$$\begin{cases} 2x + 2y = 6 \\ -x + 2y = 12 \end{cases}$$

(e)
$$\begin{cases} 10x + 7y = 49 \\ 10y - x = 70 \end{cases}$$

(c)
$$\begin{cases} 2x + 4y = 5 \\ x + 2y = 8 \end{cases}$$

(f)
$$\begin{cases} 2x + 9y = 0 \\ 3x + 5y = 17 \end{cases}$$

More problems

1. Graph the following and indicate the peak/trough (corner)

(a) $y = |x|$

(e) $y = |x + 2|$

(b) $y = |3x|$

(f) $y = -|x + 2|$

(c) $y = -|2x|$

(g) $y = |x - 4| + 1$

(d) $y = |x| + 1$

(h) $y = |x + 2| + 2$

2. In general, what happens if we add 3 to an equation? subtract 3? add c (a constant)?

3. In general, what happens if we multiply the equation by -1 ?

4. In general, what happens if we add 3 to x in an equation? subtract 3? add c (a constant)?

5. Work on the algebra questions from: <http://www.ilmathcontest.com/hs/Questions/Reg/R16AA.pdf>