Session 2.1

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. When solving for x in $13 + \frac{x}{-5} = 8$

    (a) Combine like terms

    (b) Do the same operation to both sides

    (c) Isolate the variable on one side

2. Finding points on the line: $y = \frac{2}{3}x - 2$

    (a) Choose a value for x (set $x = 3$). Ideally, choose an x that makes $\frac{2}{3}x$ an integer (easier to work with).

    (b) Plug this value in for x (plug $x = 3$ into $y = \frac{2}{3}x - 2$ and get $y = \frac{2}{3}(3) - 2$)

    (c) Solve for the value of y (expand and get $y = \frac{2}{3}(3) - 2 = 2 - 2 = 0$)

    (d) Plot or write the (x, y) point you found (plot $(x, y) = (3, 0)$)

3. Understanding the slope

    (a) Definition: $slope = \dfrac{rise}{run} = \dfrac{y_2 - y_1}{x_2 - x_1}$

    (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)

4. 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

Main problems

1. Solve each of the following for the value of x

    (a) $-11x + 1 = 13$

    (b) $\frac{3}{4}x + 2 = 6$

    (c) $\frac{2}{7}x + 1 = 7(-3 + 5x)$

    (d) $\frac{1}{x} - 4 = 3 - \frac{3}{x}$

2. Evaluate each expression with the given value of x

    (a) $\frac{2}{3}x - 7$ where $x = 3$

    (b) $-4x + 5$ where $x = 2$

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

---

(a) $y = -\dfrac{3}{2}x + 5$ where $x = 4$

(b) $y = \dfrac{2}{3}x - \dfrac{1}{7}$ where $x = \dfrac{3}{7}$

(c) $y = -\dfrac{3}{2}x + 5$ where $y = 7$

(d) $y = \dfrac{2}{3}x - \dfrac{1}{7}$ where $y = \dfrac{6}{7}$

4. 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) $y = -2x + 4$

(b) $y = \dfrac{3}{2}x - 4$

(c) $y = -\dfrac{1}{3}x + 1$

(d) $y = -1.2x + 6$

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

(a) $|x| = 4$

(b) $\left|\dfrac{x}{2}\right| \geq 3$

(c) $|2x| \leq 3$

(d) $|x + 4| = 7$

(e) $|x + 3| \leq 6$

(f) $|x + 1| \leq -2$

6. 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) $(0, 3), (2, -1)$

(b) $(-3, 3), (3, 1)$

(c) $(-3, -2), (-2, 2)$

(d) $(-2, 0), (2, -2)$

(e) $(-2, 5), (2, -1)$

(f) $(0, -3), (2, 0)$

More problems

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

(a) $y = |x|$

(b) $y = |3x|$

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

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

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

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

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

(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)?