3. Which of the following points does *not* lie in the solution set to the inequality $y \geq -\frac{1}{3}x+5$?

(1) $(6, 3)$ (3) $(-3, 8)$

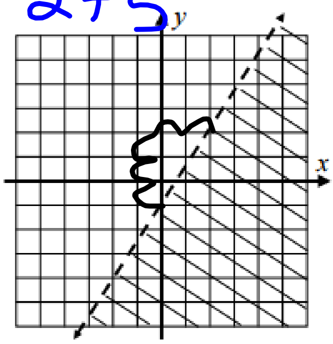
(2) $(-6, 5)$ (4) $(12, 3)$

$5 \geq -\frac{1}{3}(-6)+5$

$2+5$

$5 \geq 7$

4. Which of the following linear inequalities is shown graphed below?



(1) $y<\frac{3}{2}x-1$ (3) $y>\frac{2}{3}x-1$

(2) $\cancel{y<\frac{2}{3}x-1}$ (4) $\cancel{y\geq\frac{3}{2}x-1}$

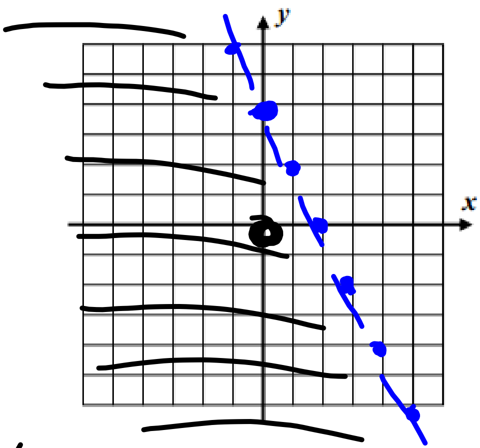
5. Graph the solution set to the inequality shown below. State one point that lies in the solution set and one point that does not.

$y < -2x + 4$

(0, 0)

$0 < -2(0) + 4$

$0 < 4$



One Point In Solution: (0, 0)

One Point Not In Solution: (2, 2)

$2 < -2(2) + 4$

$2 < -4 + 4$

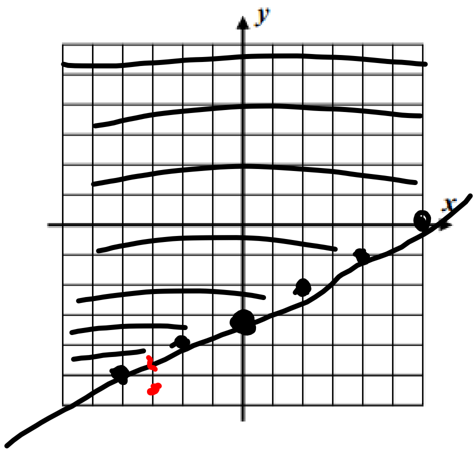
$2 < 0$

6. Rearrange the inequality below so that it is easier to graph and then sketch its solution set on the grid given. Be careful when dividing by a negative and remember to switch the inequality sign.

$x - 2y \le 6$

$$\frac{-2y}{-2} \le \frac{6 - x}{-2}$$

$$y \ge -3 + \frac{1}{2}x$$



One Point In Solution:

$(-2, -1)$

$-1 \ge -3 + -1$

$-1 \ge -4$

One Point Not In Solution:

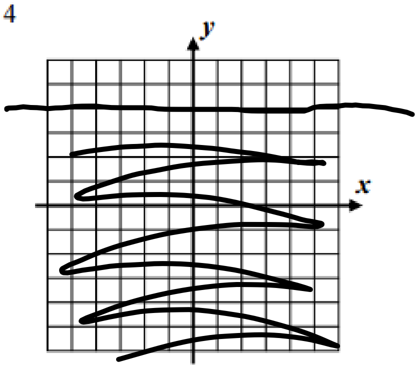
$(-3, -5)$

$-5 \ge -3 + \frac{1}{2}(-3)$

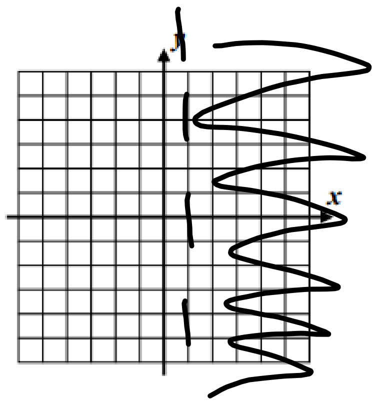
$-5 \ge -4.5$

7. Graph the solution set to each of the following inequalities.

(a) $y \le 4$



(b) $x > 1$



Bell Ringer:

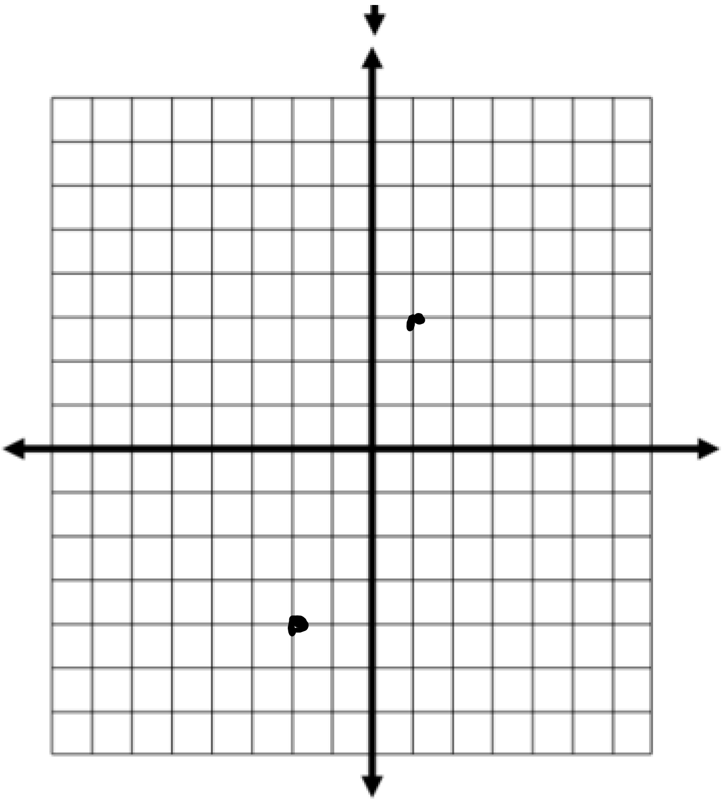
$$f(x) = \begin{cases} 2x+1 & x \geq 1 \\ \frac{x}{2} - 3 & x < 1 \end{cases}$$

Function? Yes or No

f (−2) = -4

f (6) = 13

f (1) = 3



INTRODUCTION TO SEQUENCES
COMMON CORE ALGEBRA I

A **sequence** is a very special type of function. When students first encounter sequences, they often think of them as just a list of numbers in some particular order (and then they have to find the pattern). We will start with the technical definition of a sequence in terms of a function.

SEQUENCE DEFINITION

A **sequence** is a function whose set of inputs, the **domain**, is a subset of the natural numbers, i.e. $\{1, 2, 3, 4, ...\}$. A sequence is often shown as an ordered list of numbers, called the **terms** or **elements** of the sequence. Sequence function notation can be tricky.

***Exercise* #1:** Consider the sequence below. If we represent this sequence with the letter a then do the following.

$$4, 8, 16, 32, 64, 128, 256$$

(a) Find $a(3)$ 16

(b) Find $a(1)+a(7)$ 4+256=260

(c) Find a_2. 8

(d) Find $(a_1)^2$ 16

(e) Find a_5-a_4 64−32= 32

(f) Solve for n: $a(n)=128$. n=6

Sequences are functions. The key here is that the input is simply the **number's place in line** so to speak and the output is the actual **number in the list**.

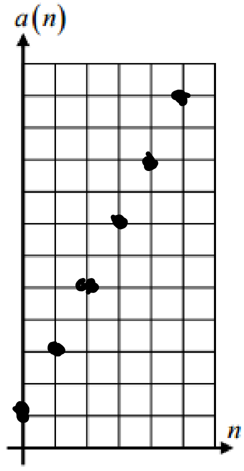
***Exercise* #2:** Consider the sequence defined by the formula $a(n) = 2n + 1$. $(0, 1)$

(a) Write out the first 5 elements of this sequence.

$1 \to 3 \quad 3 \to 7 \quad 5 \to 11$

$2 \to 5 \quad 4 \to 9$

(b) Graph the sequence on the grid shown below for $1 \leq n \leq 5$.



(c) Why shouldn't we connect the points plotted with a continuous straight line?

(d) What is the 21[st] term of this sequence? Show how you arrived at your answer.

$a(n) = 2n + 1$

$a(21) = 2(21) + 1$

$42 + 1$

43

Sequences can be defined by a classic function formula, like what we saw in Exercise #2, and they also can be defined **recursively**. A **recursive formula** is one where each term in the sequence **depends on a term or terms** that came **before it**.

***Exercise* #3:** Consider a sequence of numbers given by the following definition:

$$b_1 = 7 \text{ and } b_i = b_{i-1} + 4$$

(a) Give a common sense interpretation for this **recursive** function rule.

(b) Write out the rule for the first 4 terms and evaluate each one of them (except b_1 which is given).

1 -> 7
2 -> 11
3 -> 15
4 -> 19

One of the most famous of all **recursively defined** sequences is known as the **Fibonacci Sequence**. Let's play around with it in the next exercise.

$b_2 = b_{2-1} + 4$
$b_1 + 4$
$7 + 4$

$b_3 = b_{3-1} + 4$
$= b_2 + 4$

$b_4 = b_{4-1} + 4$
$b_3 + 4$

***Exercise* #4:** The Fibonacci Sequence is defined recursively as follows:

$$a(1)=1,\ a(2)=1 \text{ and } a(n)=a(n-1)+a(n-2)$$

(a) How do you interpret this recursive rule? Write it down in your own words.

1, 1, 2, 3, 5, 8, 13, . . .

(b) Write down the rule for $a(3), a(4)$, and $a(5)$ and determine their values.

2 3 5

Sequences often show up in the real world, where they are sometimes defined in terms of a recursive process.

***Exercise* #5:** Kirk is trying to train for the marathon. His first month, he runs 5 miles per workout. He adds an additional 3 miles to his workout for each month that he trains.

(a) Fill out the table below for the amount of miles he runs as a function of how many months he has been running.

m	1	2	3	4	5
$a(m)$	5	8	11	14	17

(b) Give a **recursive definition** for the sequence $a(m)$. Don't forget to give an initial value.

(c) Graph this sequence for $1 \le m \le 5$.