Characteristics of Functions

Types of Functions

- ***Continuous*** has NO breaks
- ***Discrete*** has gaps or breaks

Domain & Range

- The **domain** of a relation is the set of all **inputs** or **x-coordinates**.
- The **range** of a relation is the set of all **outputs** or **y-coordinates**.

Notation

Set Notation

- If the graph is discrete, list all of the inputs or outputs inside the squiggly brackets.
- Example: D= {1,2,4,5,7}

Notation

Interval Notation

For each **continuous** section of the graph, write the starting and ending point separated by a comma.

Start End

$(\#,\#)$

Parenthesis: point **is not** included in Domain/ Range

$[\#,\#]$

Brackets: point **is** included in Domain/ Range

$(\#,\#]$

$[\#,\#)$

Notation

Algebraic Notation

- Use equality and inequality symbols and variables to describe the domain and range.
- Examples:

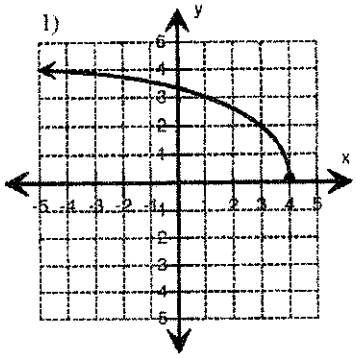
$y > 5$ $\quad -2 \le x \le \infty$

$x \ge 7$ $\quad -\infty \le y \le \infty$

Name: _____ Score: _____

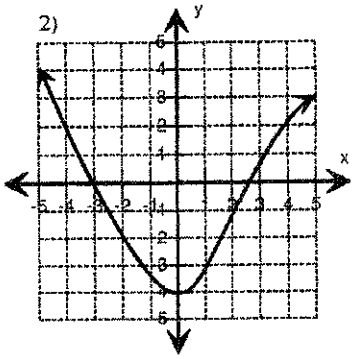
Domain and Range

Find the Domain and Range for each graph.

1) 

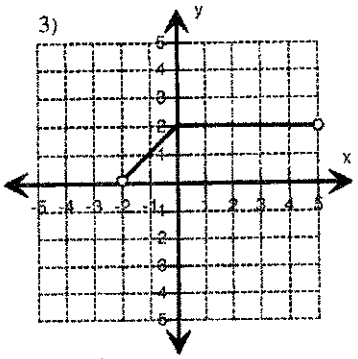
Domain : _____

Range : _____

2) 

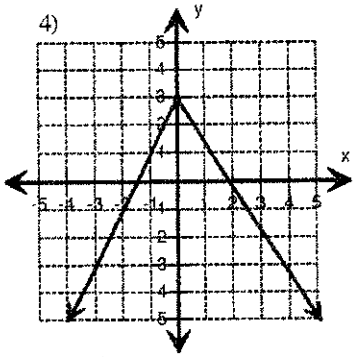
Domain : _____

Range : _____

3) 

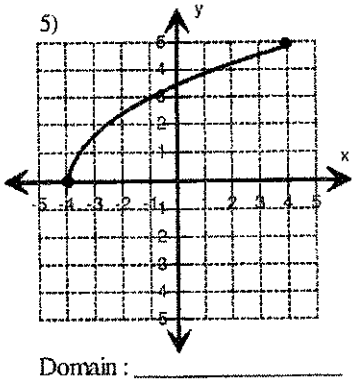
Domain : _____

Range : _____

4) 

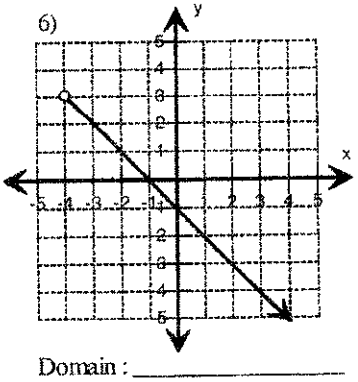
Domain : _____

Range : _____

5) 

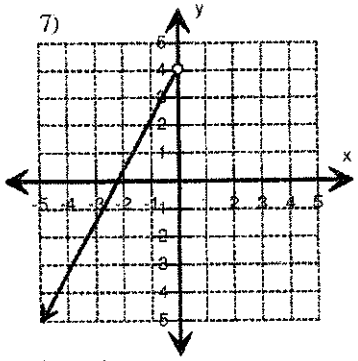
Domain : _____

Range : _____

6) 

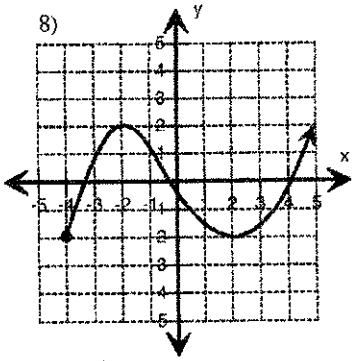
Domain : _____

Range : _____

7) 

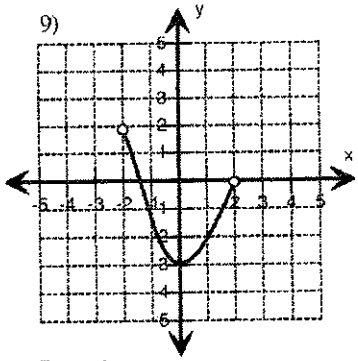
Domain : _____

Range : _____

8) 

Domain : _____

Range : _____

9) 

Domain : _____

Range : _____

Using Intercepts

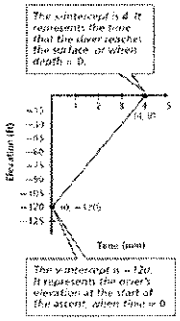
Vocabulary

y-intercept
x-intercept

Using Intercepts

The ***y*-intercept** is the *y*-coordinate of the point where the graph intersects the *y*-axis. The *x*-coordinate of this point is always 0.

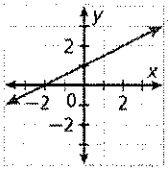
The ***x*-intercept** is the *x*-coordinate of the point where the graph intersects the *x*-axis. The *y*-coordinate of this point is always 0.



Using Intercepts

Example 1A: Finding Intercepts

Find the *x*- and *y*-intercepts.



The graph intersects the y-axis at (0, 1).

The *y*-intercept is 1.

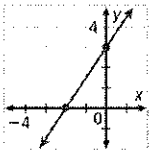
The graph intersects the x-axis at (–2, 0).

The *x*-intercept is –2.

Using Intercepts

Check It Out! Example 1a

Find the *x*- and *y*-intercepts.



The graph intersects the y-axis at (0, 3).

The *y*-intercept is 3.

The graph intersects the x-axis at (–2, 0).

The *x*-intercept is –2.

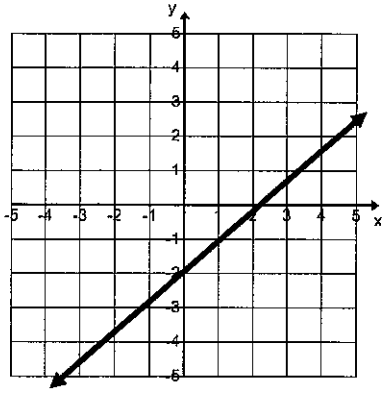
#_____

Name: _____
Date: _____ Period:_____

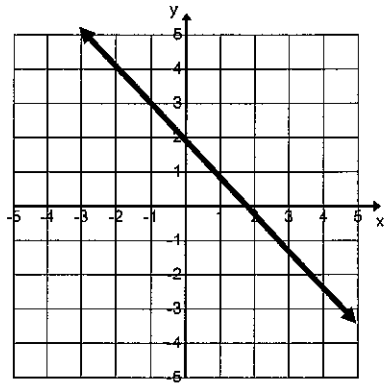
X and Y Intercepts Worksheet

Identify the x and y intercepts and write as an ordered pair

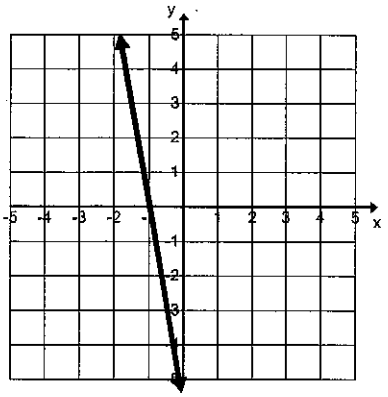
1.



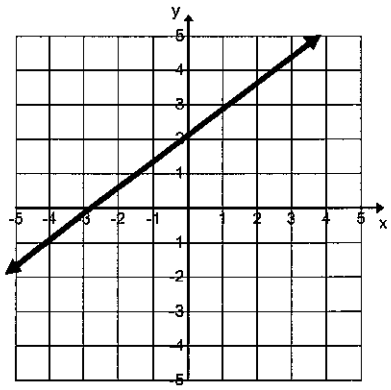
2.



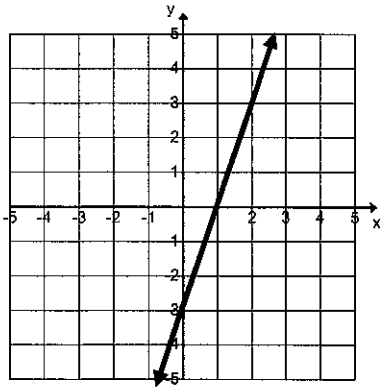
3.



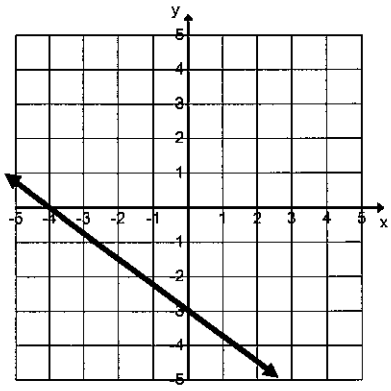
4.



5.



6.



4

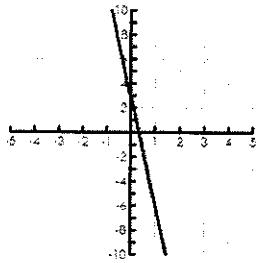
Increasing, Decreasing, or Constant

- Sweep from left to right and notice what happens to the y-values
- Finger Test- as you move your finger from left to right is it going up or down?

- ***Increasing*** goes up (L to R)
- ***Decreasing*** falls down (L to R)
- ***Constant*** is a horizontal graph

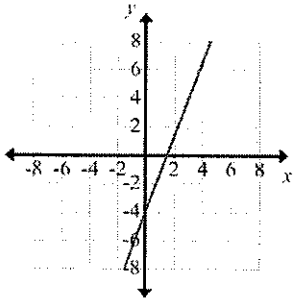
Characteristics

1. Domain:
2. Range:
3. Intercepts:
4. Increasing or Decreasing?



Characteristics

1. Domain:
2. Range:
3. Intercepts:
4. Increasing or Decreasing?

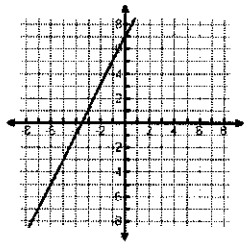


End Behavior

Figuring out what y-value the graph is going to as x gets bigger and as x gets smaller.

Describe the End Behavior

End Behavior *as* $x \to, \infty$ $y \to \infty$



End Behavior *as* $x \to -\infty$, $y \to -\infty$

End Behavior

as $x \to -\infty$, $y \to$ ___

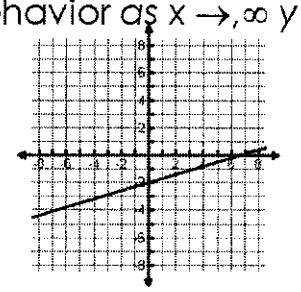
(like your left arm)

as $x \to \infty$, $y \to$ ___

(like your right arm)

Describe the End Behavior

End Behavior *as* $x \to, \infty$ $y \to$ ∞

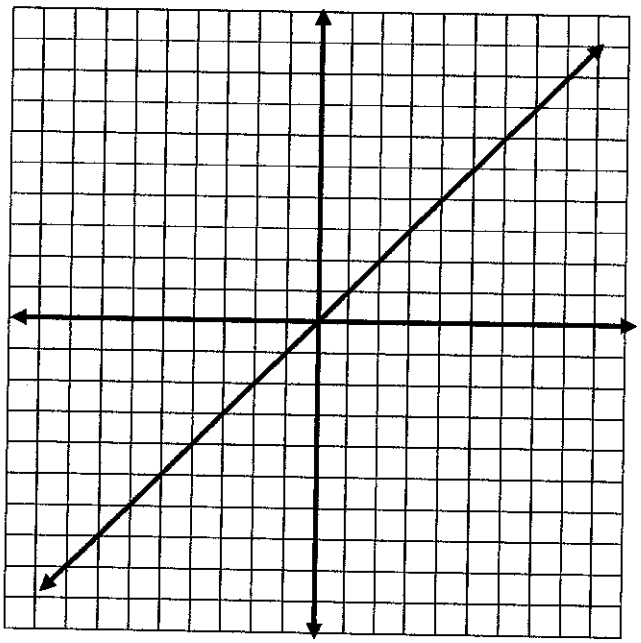


End Behavior *as* $x \to -\infty$, $y \to -\infty$

End Behavior (for linear functions)

- If the graph is going **UP**, the y-value is approaching $+\infty$.
- If the graph is going **down**, the y-value is approaching $-\infty$.

The Linear Function Family



The parent of the family is **f(x) = x**

x	f(x)
-2	-2
-1	-1
0	0
1	1
2	2
3	3

Domain $(-\infty,\infty)$
Range $(-\infty,\infty)$

x and y intercept = (0,0)

Increasing or Decreasing? Inc

END BEHVIOR:
As $x \to -\infty$, $y \to -\infty$
As $x \to \infty$, $y \to \infty$

Graph each of the following members of the linear family and explain the relation to the parent. Use the graph grid below each column.

f(x) = 2x + 3

Domain (,)
Range (,)

X- intercept:

Y- intercept:

Increasing or Decreasing?

END BEHVIOR:
As $x \to -\infty$, $y \to$ _____

As $x \to \infty$, $y \to$ _____

f(x) = - ½ x - 5

Domain (,)
Range (,)

X- intercept:

Y- intercept: :

Increasing or Decreasing?

As $x \to -\infty$, y _____

As $x \to \infty$, $y \to$ _____

f(x) = -3x – 7

Domain (,)
Range (,)

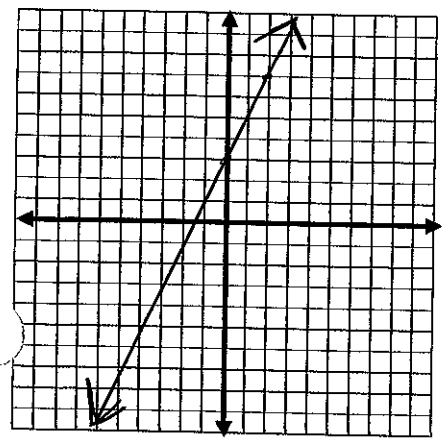
X- intercept:

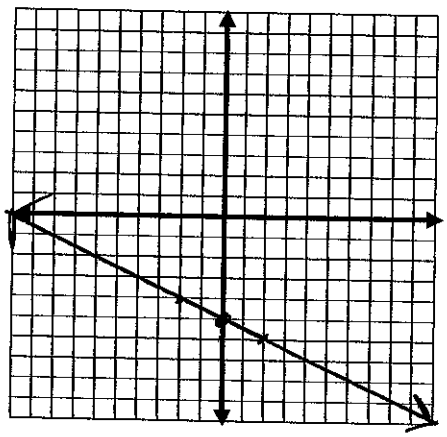
Y- intercept:

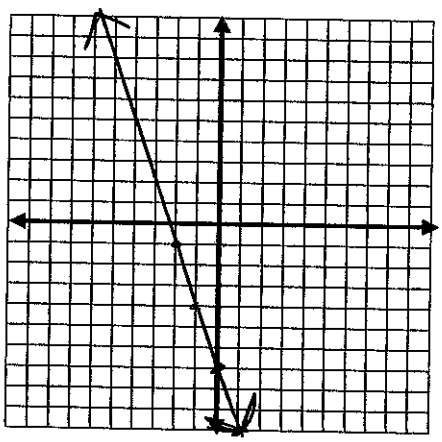
Increasing or Decreasing?

As $x \to -\infty$, $y \to$ _____

As $x \to \infty$, $y \to$ _____







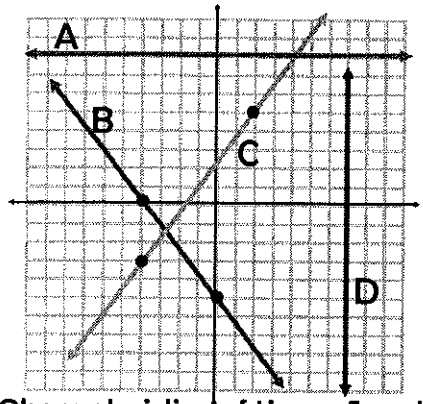
Algebra 1

Name_____

Characteristics of Linear Functions

Date_____

Warm-up: Find the rate of change.



1. Line A m = _____

2. Line B m = _____

3. Line C m = _____

4. Line D m = _____

What if you don't have a graph?

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

5. (1, 4) (6, 2)

6. (2, –3) (4, 3)

Characteristics of Linear Functions

_____ - the slope of a function

_____ - the set of x-values for a function

_____ - the set of y-values for a function

_____ - the interval where the graph rises and the y-values increase

_____ - the interval where the graph falls and the y-values decrease

_____ - the point(s) where a graph crosses the x-axis

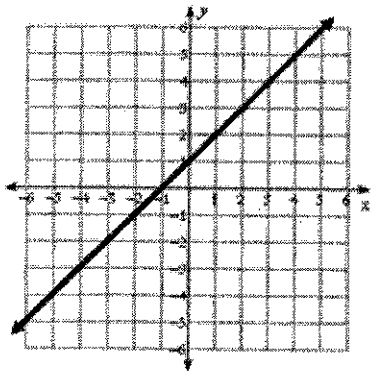
_____ - the point(s) where a graph crosses the y-axis

_____ - the behavior at the end of the graph (up or down) as x approaches negative infinity (left) or positive infinity (right).

Note: A continuous linear function will always have a domain and range that include all real numbers.

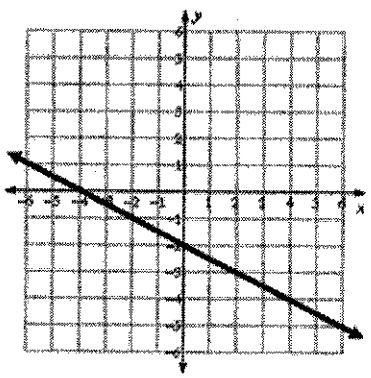
Rate of Change: the slope of a function. Find the rate of change for each function below.

1.



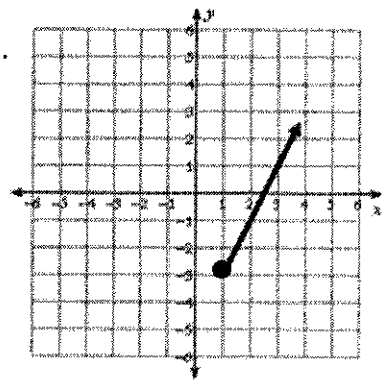
Rate of Change: _____

2.



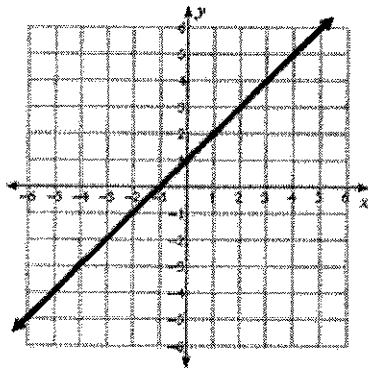
Rate of Change: _____

3.

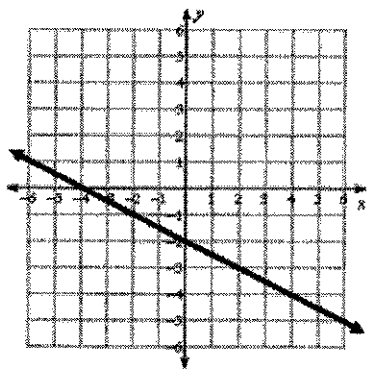


Rate of Change: _____

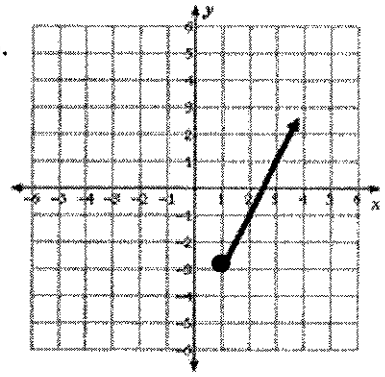
Domain: the set of x-values. **Range**: the set of y-values. Find the domain and range for each function below. Write the domain and range in inequality notation.

1. 

Domain: _____
Range: _____

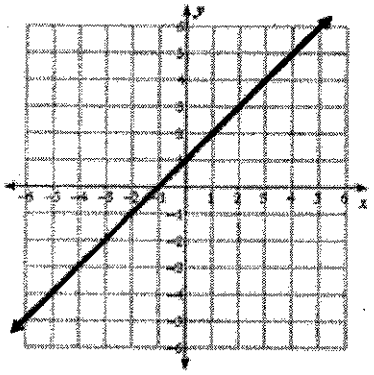
2. 

Domain: _____
Range: _____

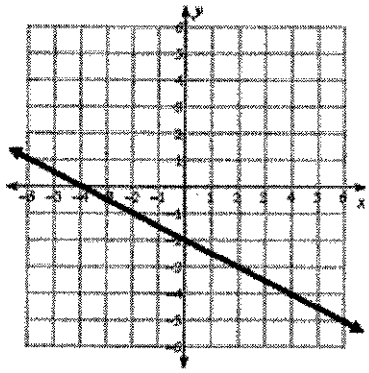
3. 

Domain: _____
Range: _____

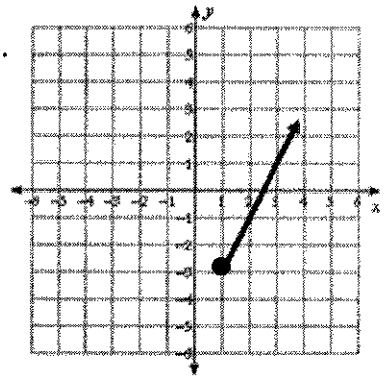
Increasing Interval: the interval where the graph rises and the y– values increase. **Decreasing Interval**: the interval where the graph falls and the y – values decrease. (The intervals should be written in inequality notation, and are written in terms of x). Find the intervals of increase and decrease for each function below.

1. 

Increasing Interval: _____
Decreasing Interval: _____

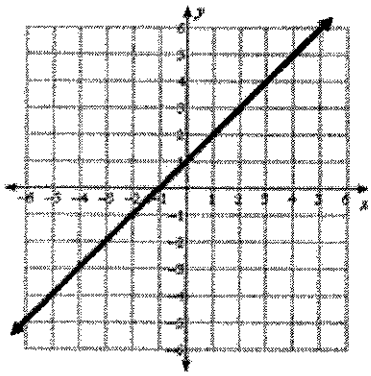
2. 

Increasing Interval: _____
Decreasing Interval: _____

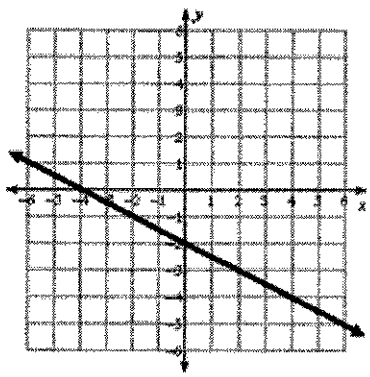
3. 

Increasing Interval: _____
Decreasing Interval: _____

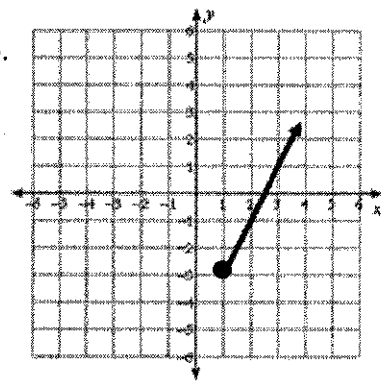
X-Intercept: the point(s) where a graph crosses the x-axis. **Y-Intercept**: the point where a graph crosses the y-axis. Find the x-intercept (s) and y-intercepts of each function below.

1. 

x – intercept(s): _____
y – intercept: _____

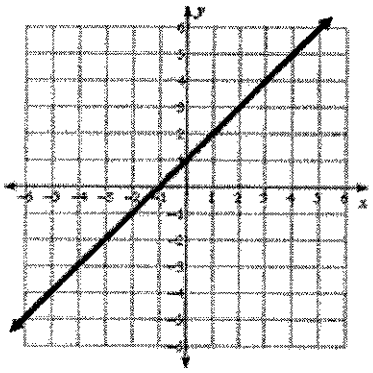
2. 

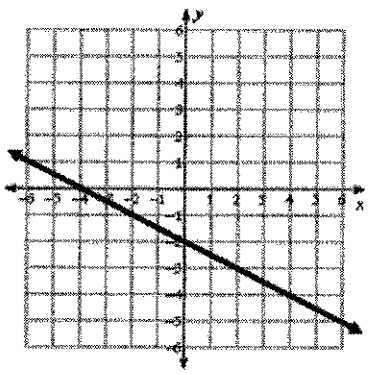
x – intercept(s): _____
y – intercept: _____

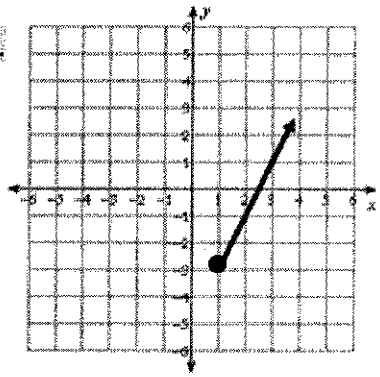
3. 

x – intercept(s): _____
y – intercept: _____

End Behavior: the behavior at the end of the graph (up or down) as x approaches negative infinity (left) or positive infinity (right). Find the left and right end behavior of each function below.

1. 

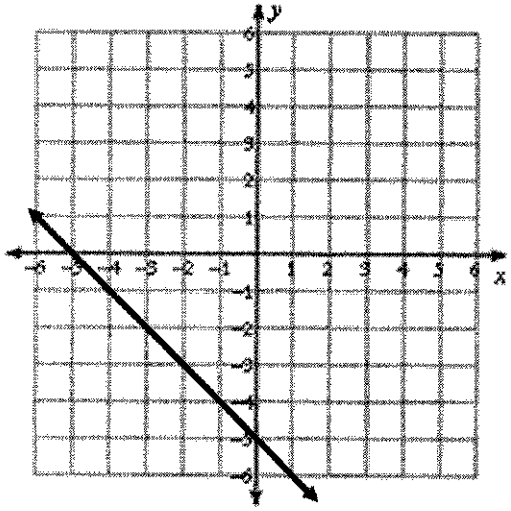
2. 

3. 

Left End Behavior: _____ Left End Behavior: _____ Left End Behavior: _____

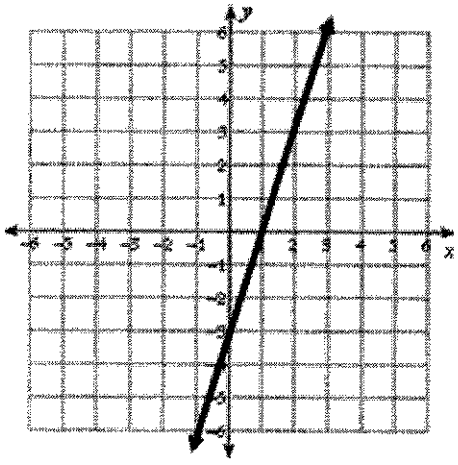
Right End Behavior: _____ Right End Behavior: _____ Right End Behavior: _____

Put it all together!



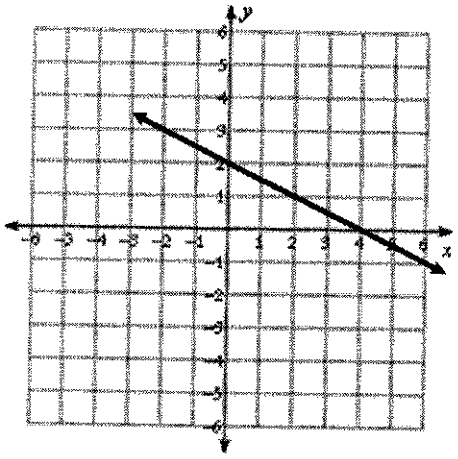
Characteristic	Answer
Rate of Change	
Domain	
Range	
Increasing Interval	
Decreasing Interval	
x-intercept	
y-intercept	
Left End Behavior	
Right End Behavior	

Classwork/Homework: Fill in the characteristics table for each function below.

1. 

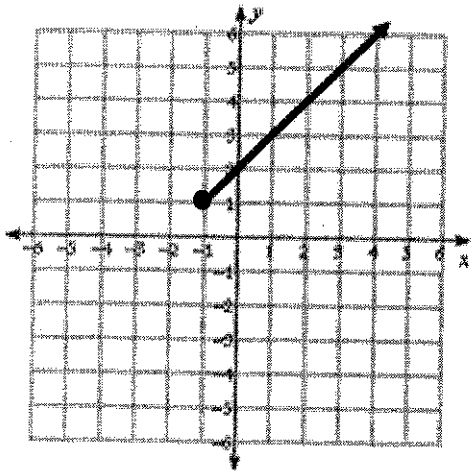
Characteristic	Answer
Rate of Change	
Domain	
Range	
Increasing Interval	
Decreasing Interval	
x-intercept	
y-intercept	
Left End Behavior	
Right End Behavior	

2.



Characteristic	Answer
Rate of Change	
Domain	
Range	
Increasing Interval	
Decreasing Interval	
x-intercept	
y-intercept	
Left End Behavior	
Right End Behavior	

3.



Characteristic	Answer
Rate of Change	
Domain	
Range	
Increasing Interval	
Decreasing Interval	
x-intercept	
y-intercept	
Left End Behavior	As x → -
Right End Behavior	