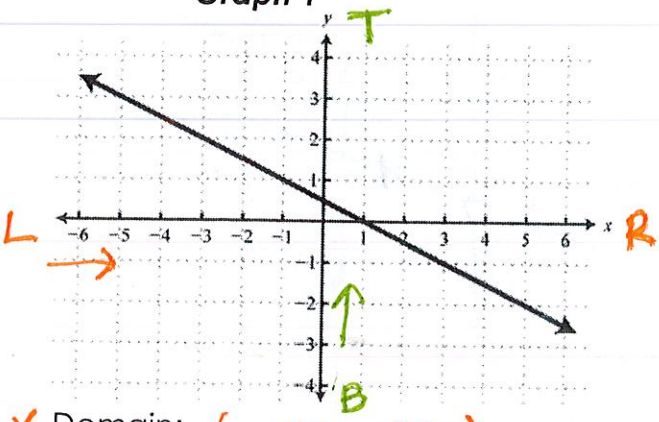
Characteristics of Linear Functions

One key component to fully understanding quadratic functions is to be able to describe characteristics of the graph and its equation. ORDER PAIR (x, y)

INTERVAL NOTATION

Domain and Range		
Domain		
Define: All possible values of x INPUT INDEPENDENT VARIABLE	**Think:** How far left to right does the graph go?	**Write:** (−∞ , ∞)
Range		
Define: All possible values of y OUTPUT – DEPENDENT	**Think:** How far down to how far up does the graph go?	**Write:** (−∞ , ∞)

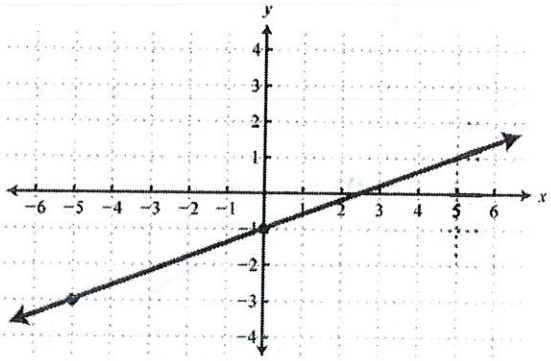
Graph 1



x Domain: (−∞ , ∞)

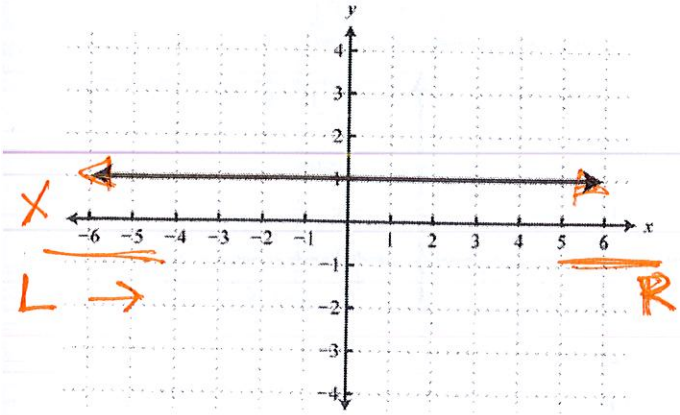
y Range: (−∞ , ∞)

Graph 2



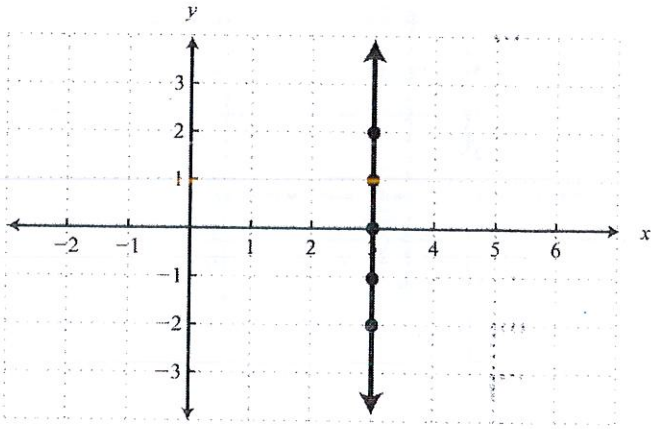
Domain: (−∞ , ∞)

Range: (−∞ , ∞)



Domain: (−∞ , ∞)

Range: y = 1



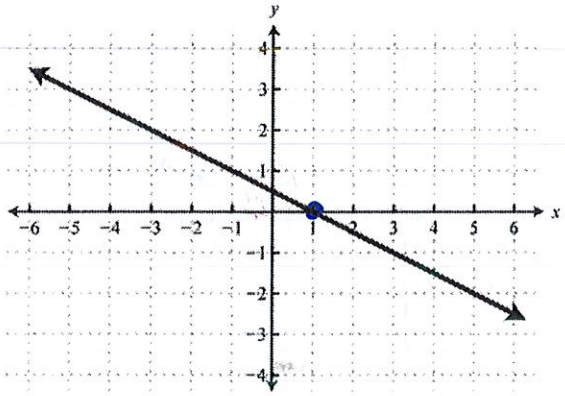
Domain: X = 3

Range: (−∞ , ∞)

Zeros and Intercepts

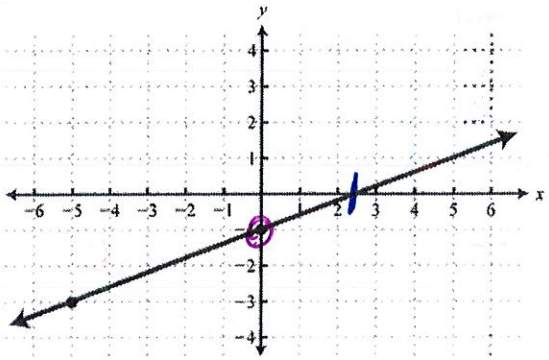
Y-Intercept		ORDERED PAIRS
Define: Point where the graph crosses the y-axis	**Think:** At what coordinate point does the graph cross the y-axis?	**Write:** (0 , y)
X-Intercept		
Define: Point where the graph crosses the x-axis	**Think:** At what coordinate point does the graph cross the x-axis?	**Write:** (X , 0)

Graph 1

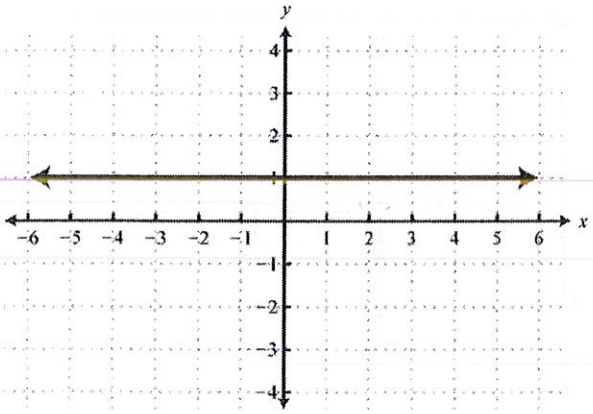


X-intercepts: (1,0) Y-intercept: (0, 1/2)

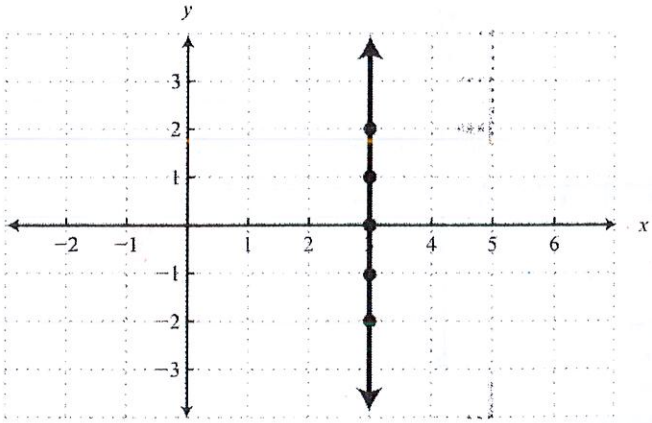
Graph 2



X-intercepts: (2.5,0) Y-intercept: (0,−1)



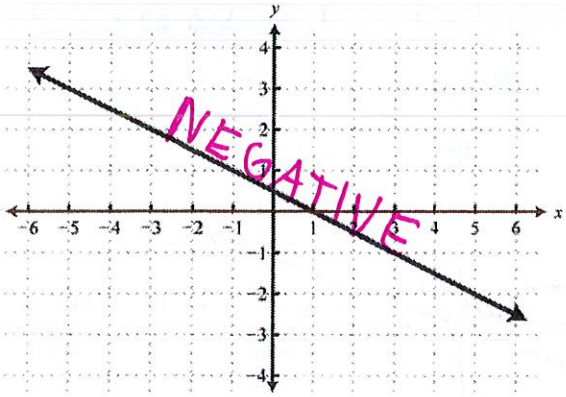
X-intercepts: None Y-intercept: (0, 1)



X-intercepts: (3,0) Y-intercept: None

Intervals of Increase, Decrease, and Constant		
Interval of Increase		POSITIVE SLOPES
Define: The part of the graph that is rising as you read left to right.	**Think:** From left to right, is my graph going up?	**Write:** $(-\infty, \infty)$
Interval of Decrease		NEGATIVE SLOPES
Define: The part of the graph that is falling as you read from left to right.	**Think:** From left to right, is my graph going down?	**Write:** $(-\infty, \infty)$

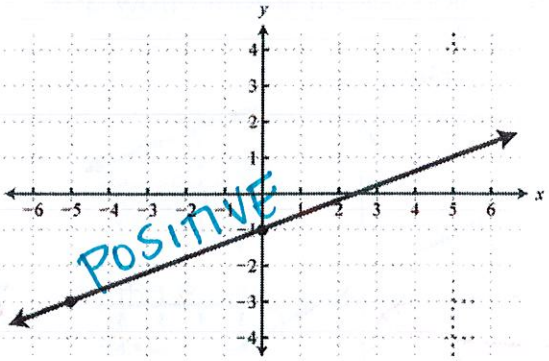
Graph 1



Int of Increase:

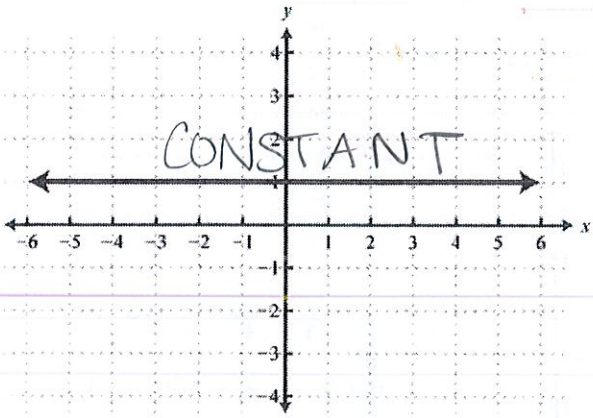
Int of Decrease: $(-\infty, \infty)$

Graph 2



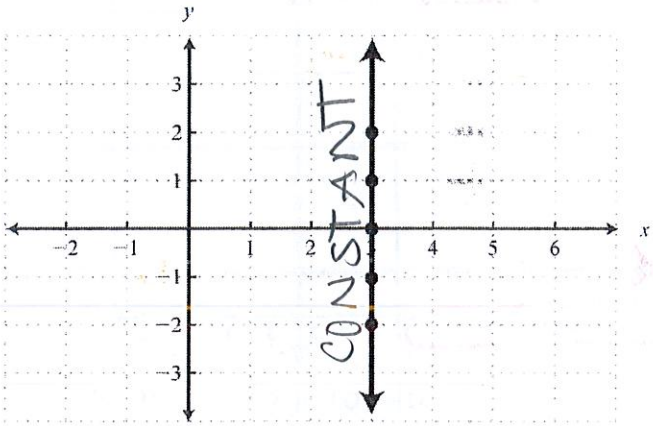
Int of Increase: $(-\infty, \infty)$

Int of Decrease:



Int of Increase:

Int of Decrease:



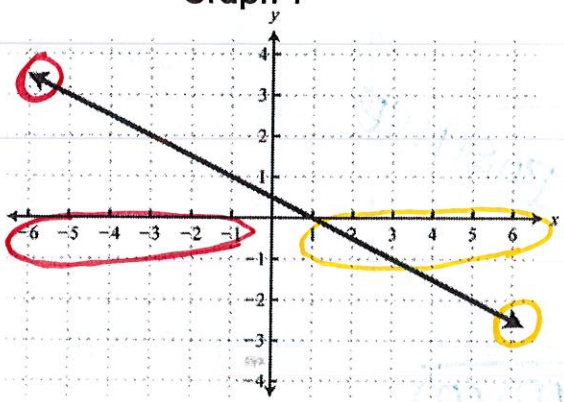
Int of Increase:

Int of Decrease:

End Behavior

End Behavior $f(x) \to y$	
Define: Behavior of the ends of the function (what happens to the y-values or f(x)) as x approaches positive or negative infinity. The arrows indicate the function goes on forever so we want to know where those ends go.	
Think: As x goes to the left (negative infinity), what direction does the left arrow go?	**Write:** $x \to -\infty$ $y \to$? When x is − y is what?
Think: As x goes to the right (positive infinity), what direction does the right arrow go?	**Write:** $x \to \infty$ $y \to$? When x is + y is what?

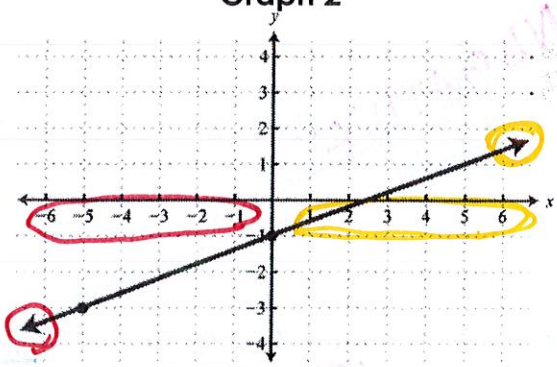
Graph 1



As x → -∞, f(x) → ∞.

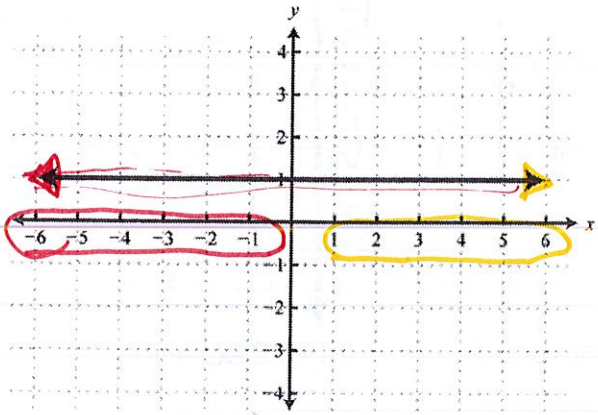
As x → ∞, f(x) → $-\infty$.

Graph 2



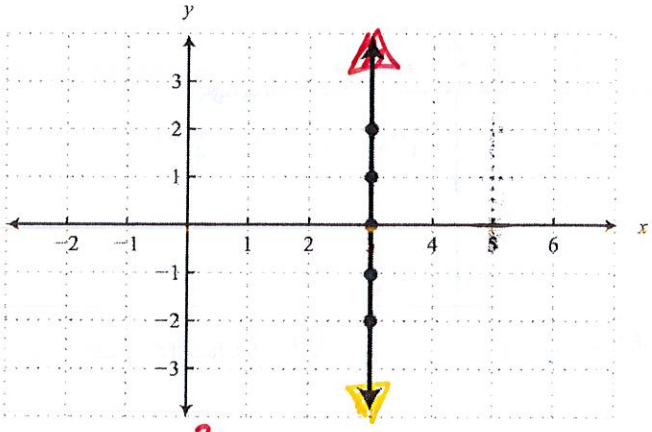
As x → -∞, f(x) → $-\infty$.

As x → ∞, f(x) → ∞.



As x → -∞, f(x) → 1.

As x → ∞, f(x) → 1.



As x → ~~-∞~~ 3, f(x) → ∞.

As x → ~~∞~~ 3, f(x) → $-\infty$.

Name: _____ Date: _____

$y = mx + b$ Practice – Solve for y and Graph $Ax + By = C$

Slope intercept — Standard

Solve each equation for y. Then, graph the equation.

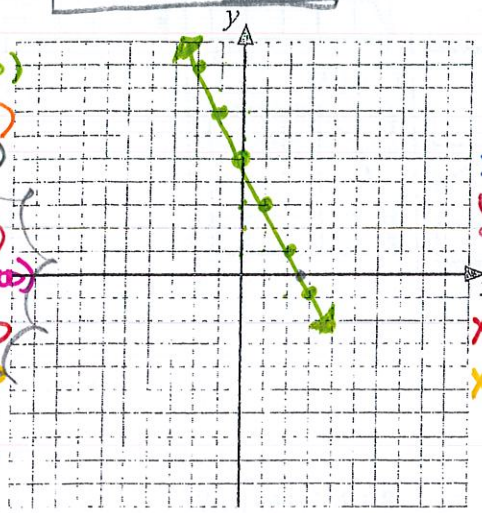
SADMEP

1. $2x + y = 5$

$-2x \quad -2x$

$\boxed{y = -2x + 5}$

D: $(-\infty, \infty)$
R: $(-\infty, \infty)$
X int: $(2.5, 0)$
y int: $(0, 5)$
Int D: $(-\infty, \infty)$
$x \to -\infty \; y \to \infty$
$x \to \infty \; y \to -\infty$



$y = -2x + 5$
$0 = -2x + 5$
$-5 = -2x$
$\frac{5}{2} = x$

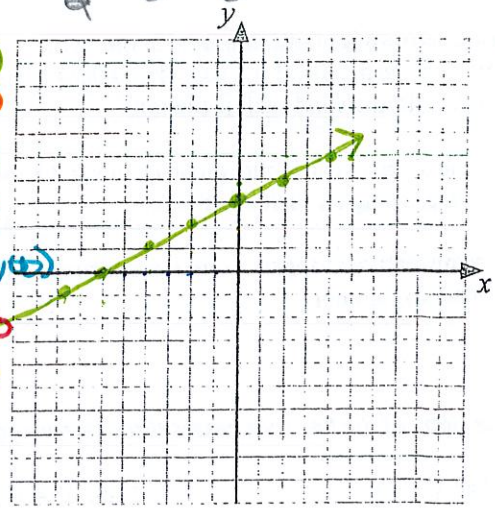
2. $2y - x = 6$

$+x \quad +x$

$\frac{2y}{2} = \frac{1x}{2} + \frac{6}{2}$

$\boxed{y = \frac{1}{2}x + 3}$

D: $(-\infty, \infty)$
R: $(-\infty, \infty)$
X int: $(-6, 0)$
y int: $(0, 3)$
Int I: $(-\infty, \infty)$
$x \to -\infty \; y \to -\infty$
$x \to \infty \; y \to \infty$



3. $2x + 3y = 15$

$-2x \quad -2x$

$\frac{3y}{3} = \frac{-2x}{3} + \frac{15}{3}$

$\boxed{y = -\frac{2}{3}x + 5}$

D: $(-\infty, \infty)$
R: $(-\infty, \infty)$
X int: $(7.5, 0)$
y int: $(0, 5)$
Int. D: $(-\infty, \infty)$
$x \to -\infty \; y \to \infty$
$x \to \infty \; y \to -\infty$

$y = -\frac{2}{3}x + 5$
$0 = -\frac{2}{3}x + 5$
$3 \cdot -5 = -\frac{2}{3}x \cdot 3$
$-15 = -2x$
$15/2 = x$

4. $3(x + 2) - y + 2 = 14$

$3x + 6 - y + 2 = 14$
$3x - y + 8 = 14$
$3x - y = 6$
$-3x \quad -3x$

$\frac{-y}{-1} = \frac{-3x}{-1} + \frac{6}{-1}$

$\boxed{y = 3x - 6}$

D: $(-\infty, \infty)$
R: $(-\infty, \infty)$
X int: $(2, 0)$
y int: $(0, -6)$
Int I: $(-\infty, \infty)$
$x \to -\infty \; y \to -\infty$
$x \to \infty \; y \to \infty$