

$$51. f(x) = \begin{cases} -15 & \text{if } x < -5 \\ \sqrt{x+6} & \text{if } -5 \leq x \leq 10 \\ \frac{2}{x} + 8 & \text{if } x > 10 \end{cases}$$

1) Evaluate each for #51;

$$f(-6) =$$

1<sup>st</sup> -15

$$f(-2) = \sqrt{-2+6}$$

2<sup>nd</sup> 2

$$f(10) = \sqrt{10+6}$$

2<sup>nd</sup> 4

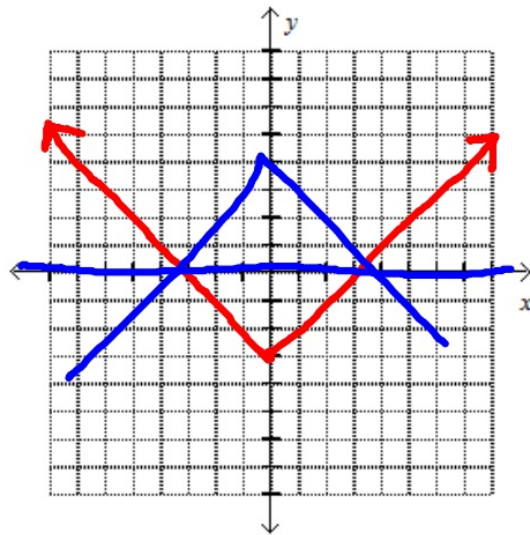
2) A jazz ensemble is looking for 3 trombones, 4 trumpets and 1 drummer. They have 6 trombones, 7 trumpets and 3 drummers to choose from. How many different groups are possible?

$${}^6C_3 \cdot {}^7C_4 \cdot {}^3C_1 = 2100$$

3) A spinner has 8 sections; green is  $\frac{1}{4}$  of the spinner. If you spin 80 times, how many should you expect to land on green?

$$\frac{1}{4} \cdot 80 = 20 \qquad 4 \cdot \underline{\quad} = 80$$

1. Graph:  $f(x) = |x| - 3$



Type: **Abs. Value**

Transformation(s): **Down 3**

Domain: **R**

Range:  $y \geq -3$   **$(-3, 3)$**

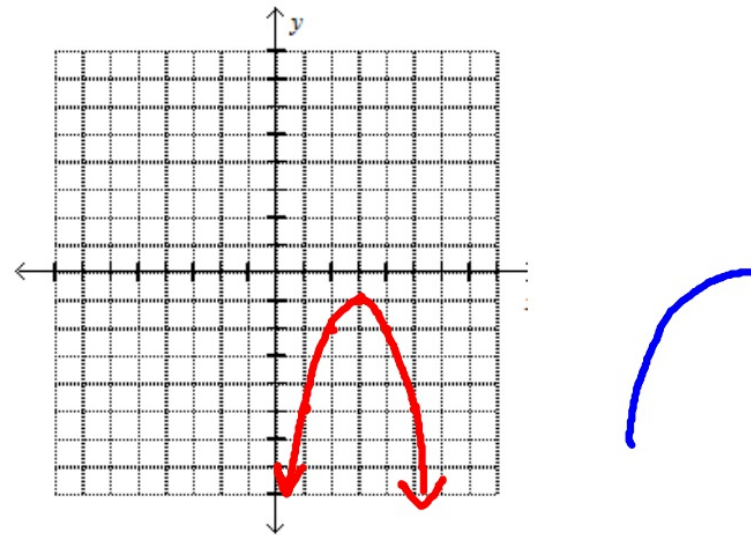
Positive Interval:

**$(-\infty, -3) \cup (3, \infty)$**

Increasing Interval:  **$(0, \infty)$**

Extrema: **Abs. Min.**

2. Graph:  $f(x) = -(x - 3)^2 - 1$



Type: **Quadratic**

Transformation(s): **Reflection, Right 3, Down 1**

Domain: **R**

Range:  $y \leq -1$

Positive Interval: **Never**

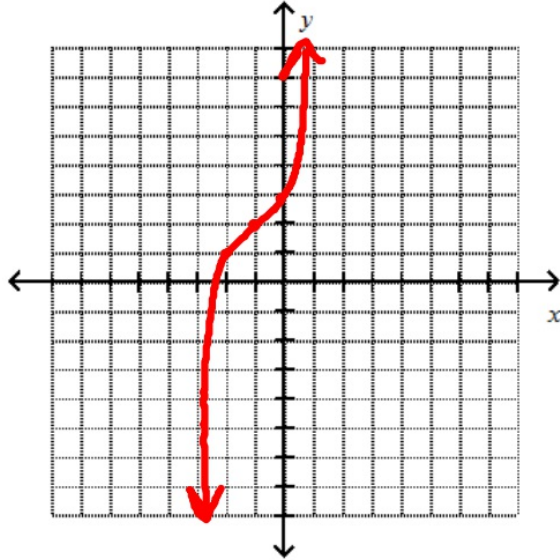
Increasing Interval:  **$(-\infty, 3)$**

End Behavior: **as  $x \rightarrow -\infty$   $f(x) \rightarrow -\infty$**

**as  $x \rightarrow \infty$   $f(x) \rightarrow -\infty$**

Extrema: **Abs. Max**

3. Graph:  $f(x) = (x + 1)^3 + 2$



Critical Point: **P.O.I.**

Type: **Cubic**

Transformation(s):

**Left 1, Up 2**

Domain: **R**

Range: **R**

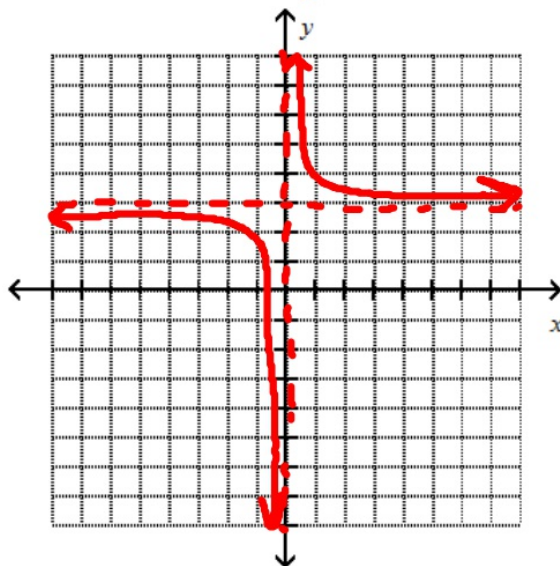
Positive Interval:  **$(-2.?, \infty)$**

Increasing Interval:  **$(-\infty, \infty)$**

End Behavior: **as  $x \rightarrow -\infty$   $f(x) \rightarrow -\infty$**

**as  $x \rightarrow \infty$   $f(x) \rightarrow \infty$**

4. Graph:  $f(x) = \frac{1}{x} + 3$



Type: **Rational**

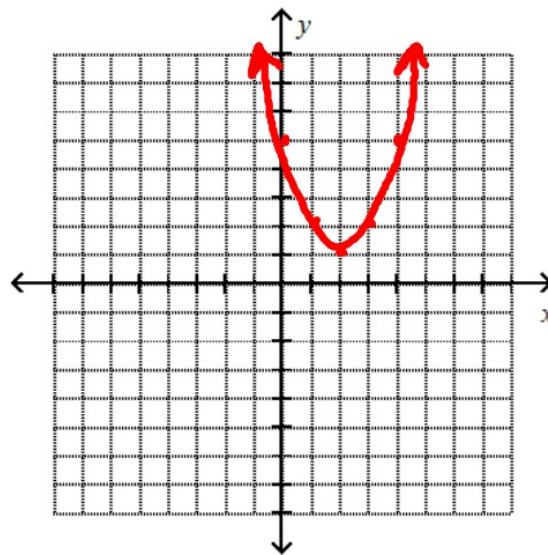
Transformation(s):

**Up 3**

Domain:  **$x \neq 0$**

Range:  **$y \neq 3$**

5. Graph:  $f(x) = (x - 2)^2 + 1$



Extrema: **Abs. Min.**

Type: **Quadratic**

Transformation(s):

**Right 2, Up 1**

Domain: **R**

Range:  **$y \geq 1$**

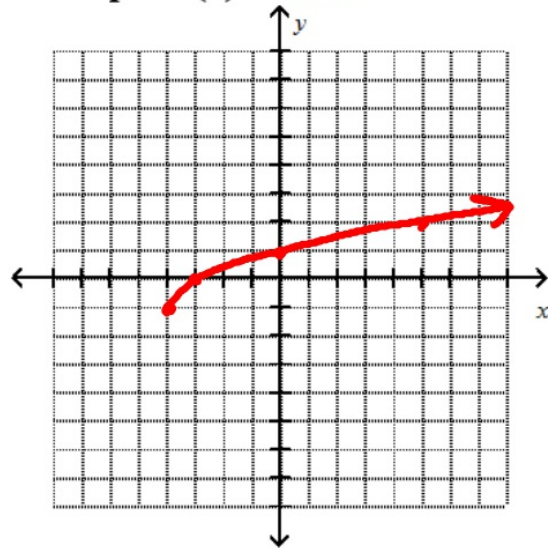
Positive Interval: **R**

Increasing Interval:  **$(2, \infty)$**

End Behavior: **as  $x \rightarrow -\infty$   $f(x) \rightarrow \infty$**

**as  $x \rightarrow \infty$   $f(x) \rightarrow \infty$**

6. Graph:  $f(x) = \sqrt{x+4} - 1$



Type: **Square Root**

Transformation(s):

**Left 4, Down 1**

Domain:  **$x \geq -4$**

Range:  **$y \geq -1$**

Positive Interval:  **$(-3, \infty)$**

Increasing Interval:  **$[-4, \infty)$**

$$1) f(x) = \begin{cases} 3x + 2, & x \leq -4 \\ -4, & x > -4 \end{cases}$$

$$f(-6) \quad \square$$

$$f(-4)$$

$$f(2) =$$

$$2) f(x) = \begin{cases} -2x - 4, & x \geq 3 \\ x + 4, & x < 3 \end{cases}$$

$$f(1) \quad \square$$

$$f(3)$$

$$f(5)$$

$$3) f(x) = \begin{cases} -2x - 5, & x \leq 2 \\ \frac{1}{2}x + 5, & x > 2 \end{cases}$$

$$f(0) \quad \square$$

$$f(2)$$

$$f(4)$$

$$5) f(x) = \begin{cases} x + 7, & x \geq 4 \\ -2x, & 0 \leq x < 4 \\ 5, & x < 0 \end{cases}$$

$$f(-6) \quad \square$$

$$f(4) =$$

$$f(8) =$$

$$4) f(x) = \begin{cases} 3, & x \leq -2 \\ -2 - 4x, & -2 < x < 3 \\ x^2 - 1, & x \geq 3 \end{cases}$$

$$f(-5) \quad \square$$

$$f(1) =$$

$$f(3) =$$

$$6) f(x) = \begin{cases} -3x + 1, & x \leq 6 \\ \frac{2}{3}x + 3, & x > 6 \end{cases}$$

$$f(-2) \quad \square$$

$$f(6) =$$

$$f(9) =$$

Unit 5: Functions

# Piecewise Functions

**Graphing**

**What is the probability of guessing and answering this question correctly?**

**A.  $1/3$**

**B.  $2/3$**

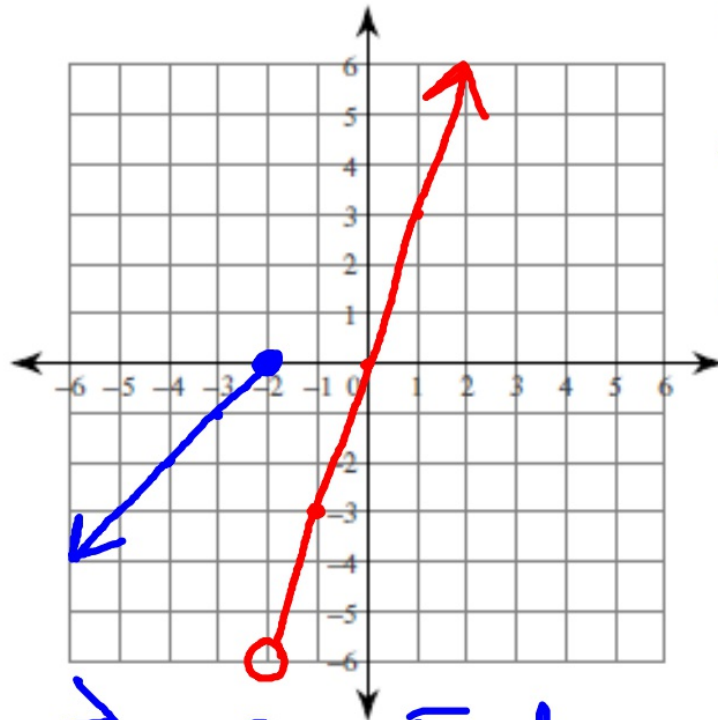
**C.  $1/3$**



**piecewise function -**  
**a function that cannot be**  
**represented by a single**  
**equation**

**Ex. A job that pays more for overtime**

**Example 1:**  $f(x) = \begin{cases} x + 2 & \text{if } x \leq -2 \\ 3x & \text{if } x > -2 \end{cases}$

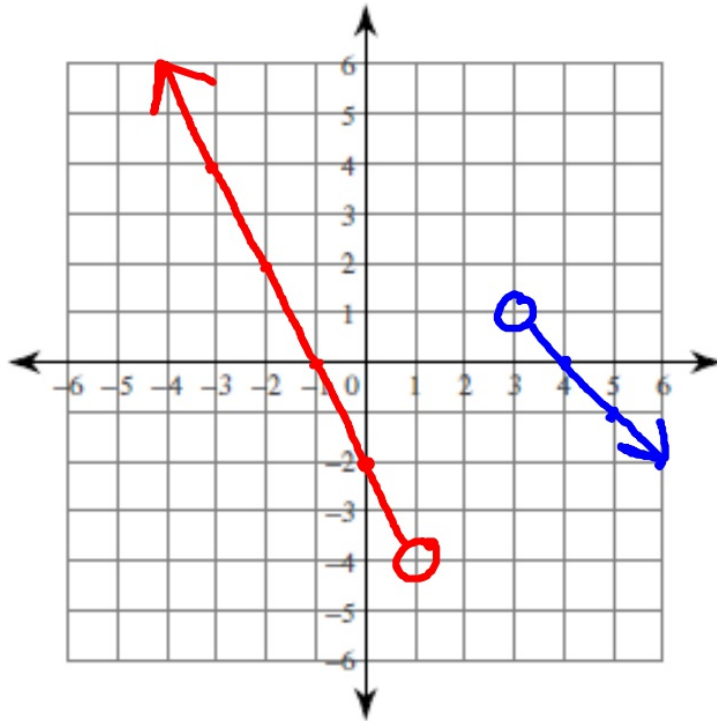


$(-2, 0)$   
 $-2 + 2 = 0$   
 $(-3, -1)$   
 $-3 + 2 = -1$

$(-2, -6)$   
 $3(-2) = -6$   
 $(-1, -3)$   
 $3(-1) = -3$

$\leq$     $\geq$     $\bullet$    Endpoints  
 $<$     $>$     $\circ$    Only

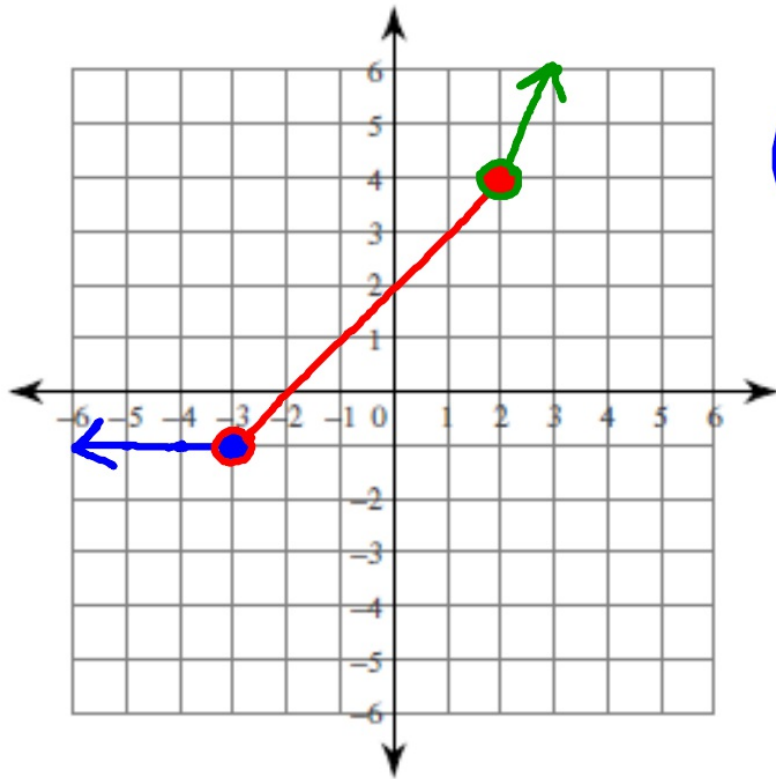
Try This 1:  $f(x) = \begin{cases} 4 - x & \text{if } x > 3 \\ -2x - 2 & \text{if } x < 1 \end{cases}$



$(3, 1)$	$(1, -4)$
$4 - 3 = 1$	$-2(1) - 2 = -4$
$(4, 0)$	$(0, -2)$
$4 - 4 = 0$	$-2(0) - 2 = -2$

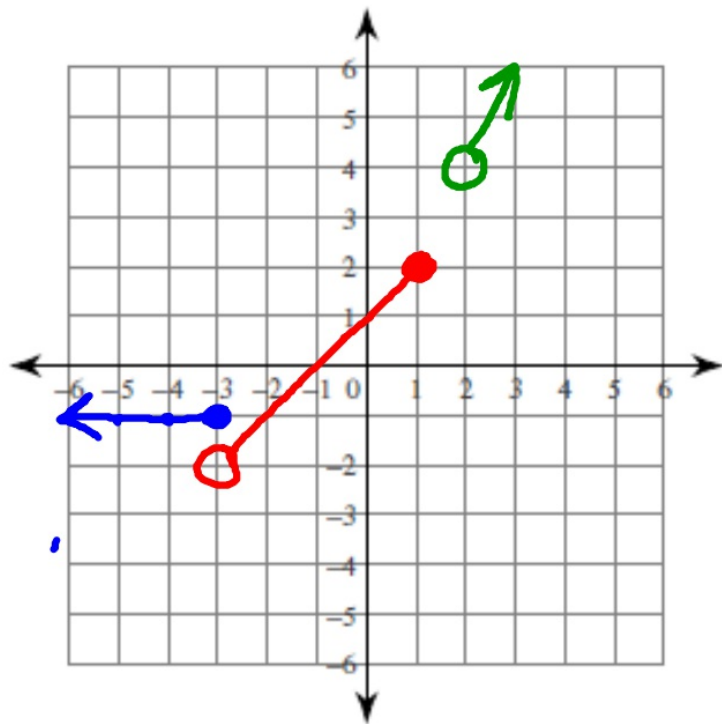
**Example 2:**

$$\text{Graph } f(x) = \begin{cases} -1 & \text{if } x \leq -3 \\ 2 + x & \text{if } -3 < x \leq 2 \\ 2x & \text{if } x > 2 \end{cases}$$



$(-3, -1)$	$(-3, -1)$	$(2, 4)$
$y = -1$	$2 + (-3) = -1$	$2(2) = 4$
$(-4, -1)$		$(3, 6)$
	$(2, 4)$	$2(3) = 6$
	$2 + 2 = 4$	

Try This 2:  $f(x) = \begin{cases} -1 & \text{if } x \leq -3 \\ 1 + x & \text{if } -3 < x \leq 1 \\ 2x & \text{if } x > 2 \end{cases}$



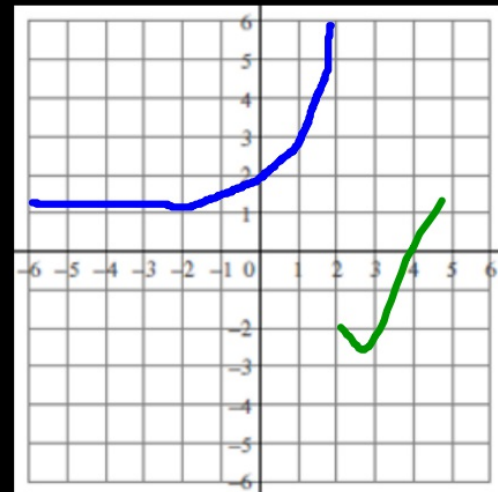
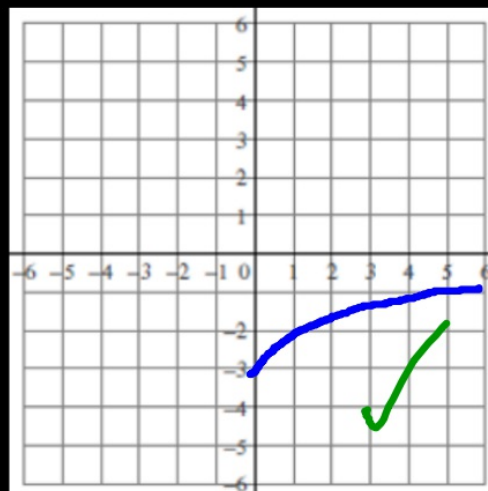
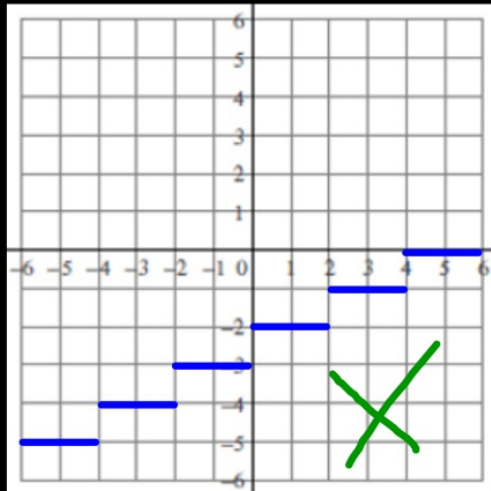
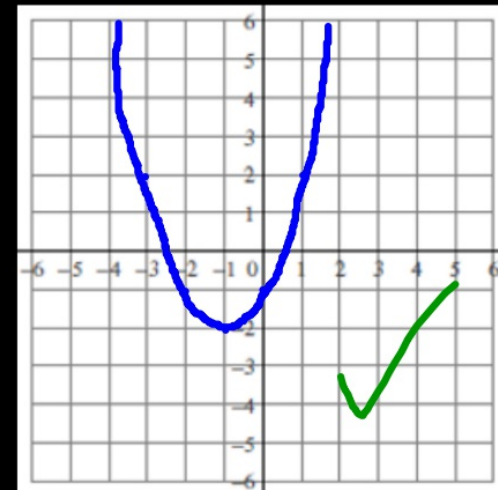
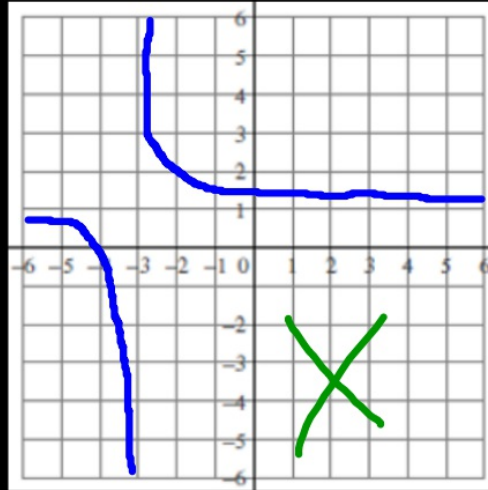
$(-3, -1)$        $(-3, -2)$        $(2, 4)$   
 $y = -1$        $1 + -3 = -2$        $2(2) = 4$   
 $(-4, -1)$        $(1, 2)$        $(3, 6)$   
                           $1 + 1 = 2$        $2(3) = 6$

**Continuous Functions --**

**Being able to trace the graph of  
the function without picking up  
your finger**

**No jumps, holes or gaps in the  
graph**

# Continuous?



**Assignment:**

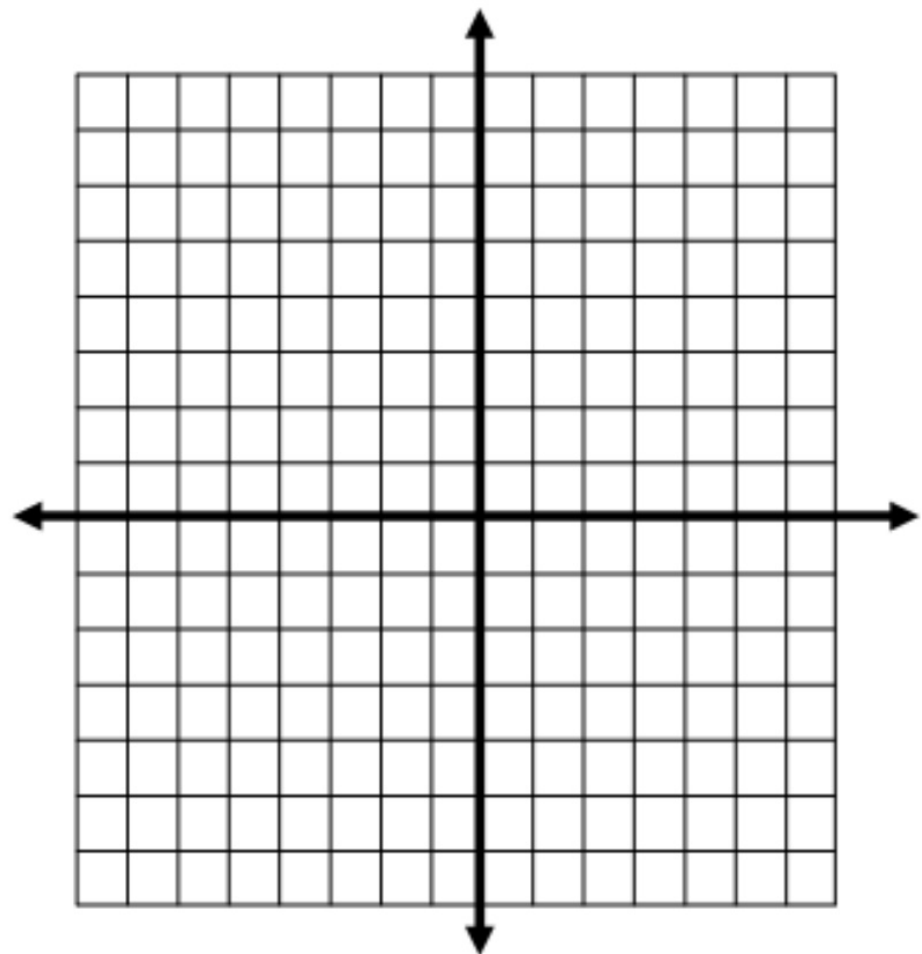
**WS 509 #1-5**

**E.C. for All**

**Function values are separate questions from the graphing**



3.  $f(x) = \begin{cases} \cancel{4}x - 2 & x \geq 3 \\ -\frac{x}{3} + 4 & x < 3 \end{cases}$



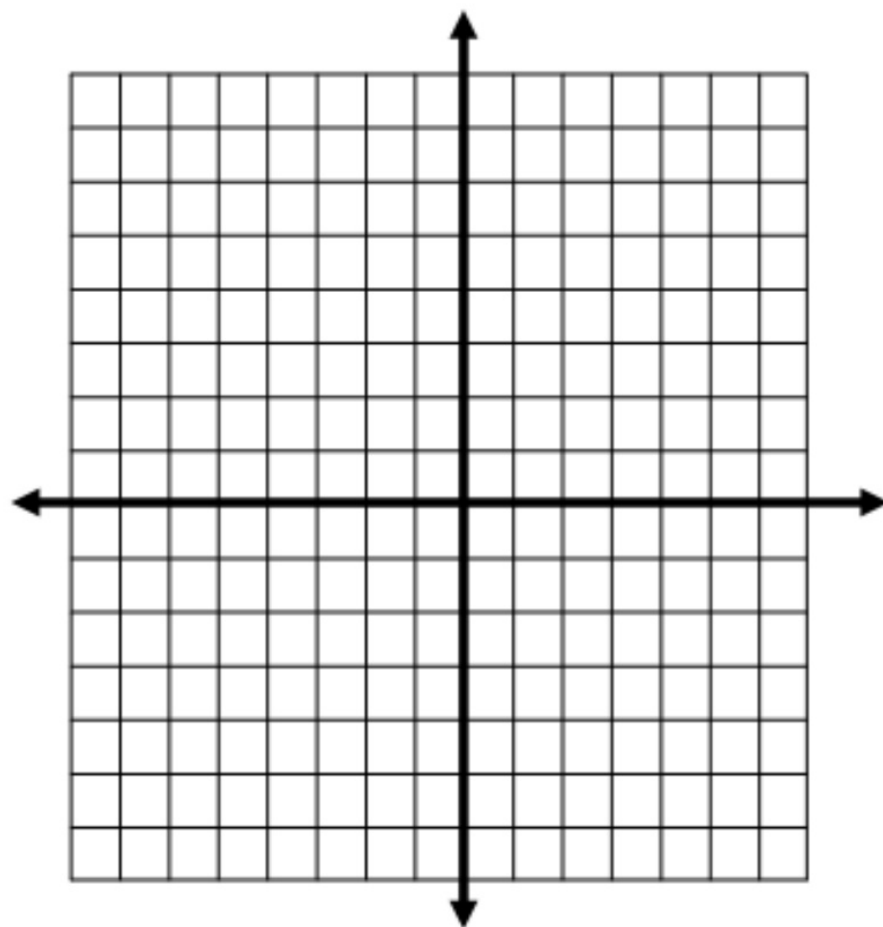
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$f(-4) =$

$f(8) =$

$f(2) =$

4. 
$$\begin{cases} -x + 4 & x \leq 0 \\ \frac{2}{3}x - 1 & 0 < x \leq 6 \\ 2 & x > 6 \end{cases}$$



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$$f(-2) =$$

$$f(0) =$$

$$f(5) =$$