

Carefully graph each of the following. State the domain and range of each piecewise function. Then, evaluate the graph at any specified domain value.

1. $f(x) = \begin{cases} x + 5 & x < -2 \\ x^2 + 2x + 3 & x \geq -2 \end{cases}$

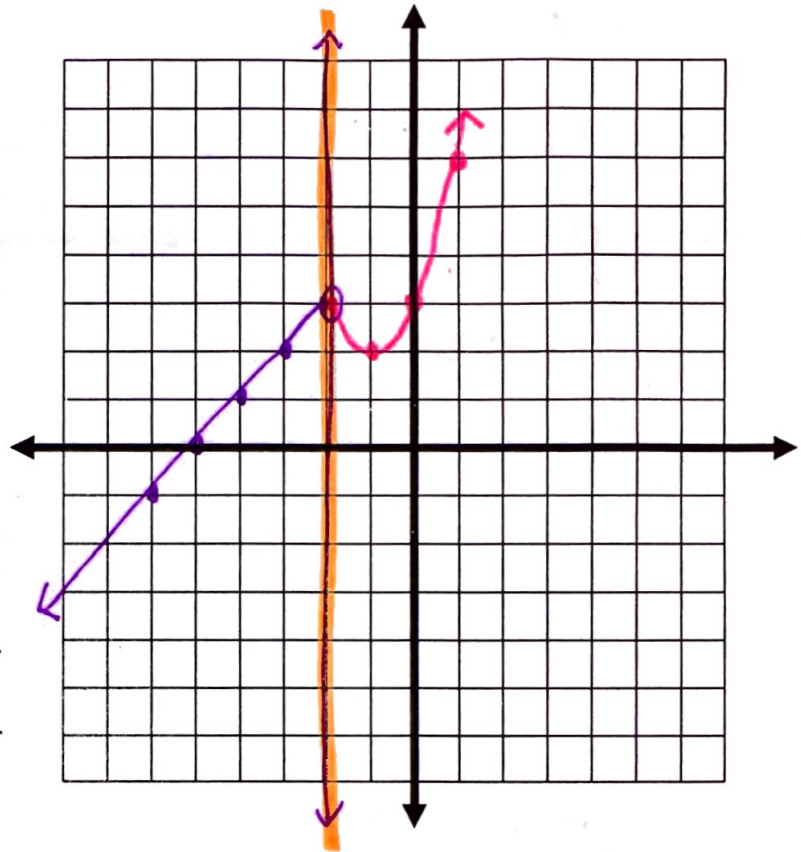
$f(3) = 18$

$f(-4) = 1$

$f(-2) = 3$

Domain: $\{x \mid x \in \mathbb{R}\}$

Range: $\{y \mid y \in \mathbb{R}\}$



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

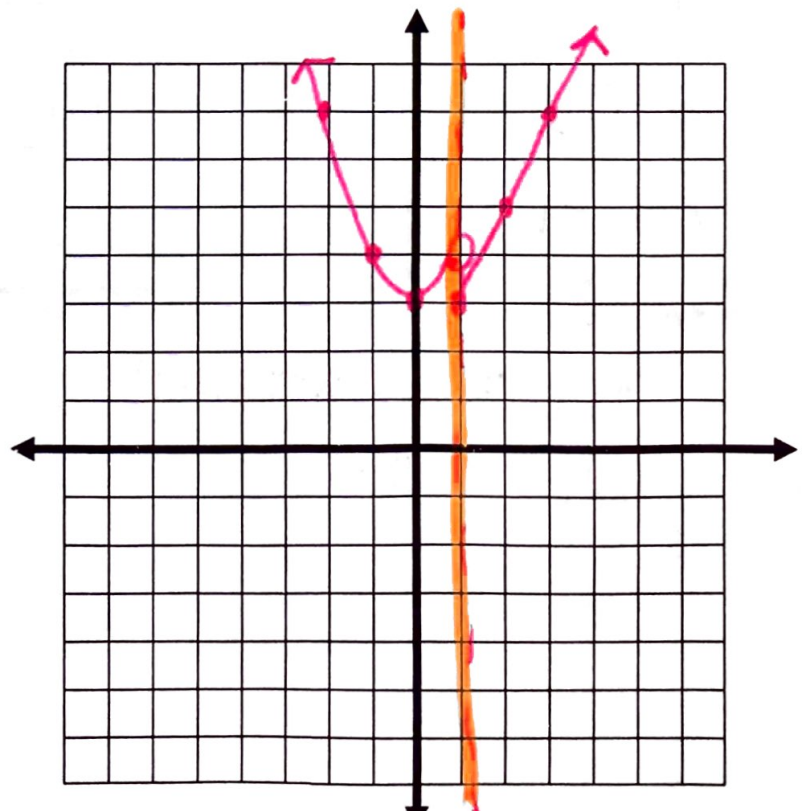
$f(-2) = 7$

$f(6) = 13$

$f(1) = 3$

Domain: $\{x \mid x \in \mathbb{R}\}$

Range: $\{y \mid y \geq 3\}$



$$3. \quad f(x) = \begin{cases} -2x+1 & x < 2 \\ 5x-4 & x > 2 \end{cases}$$

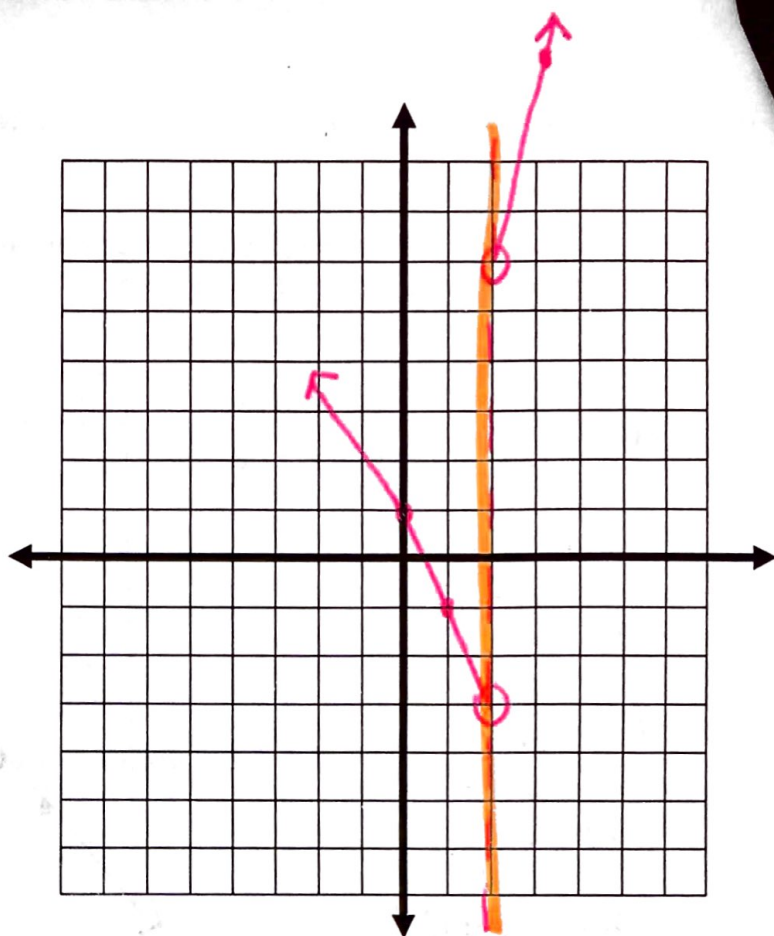
$$f(-4) = 9$$

$$f(8) = 36$$

$$f(2) = \emptyset$$

$$\text{Domain: } \{x \mid x \neq 2\}$$

$$\text{Range: } \{y \mid y \neq -3\}$$



$$4. \quad f(x) = \begin{cases} x^2 - 1 & x \leq 0 \\ 2x - 1 & 0 < x < 4 \\ 3 & x > 4 \end{cases}$$

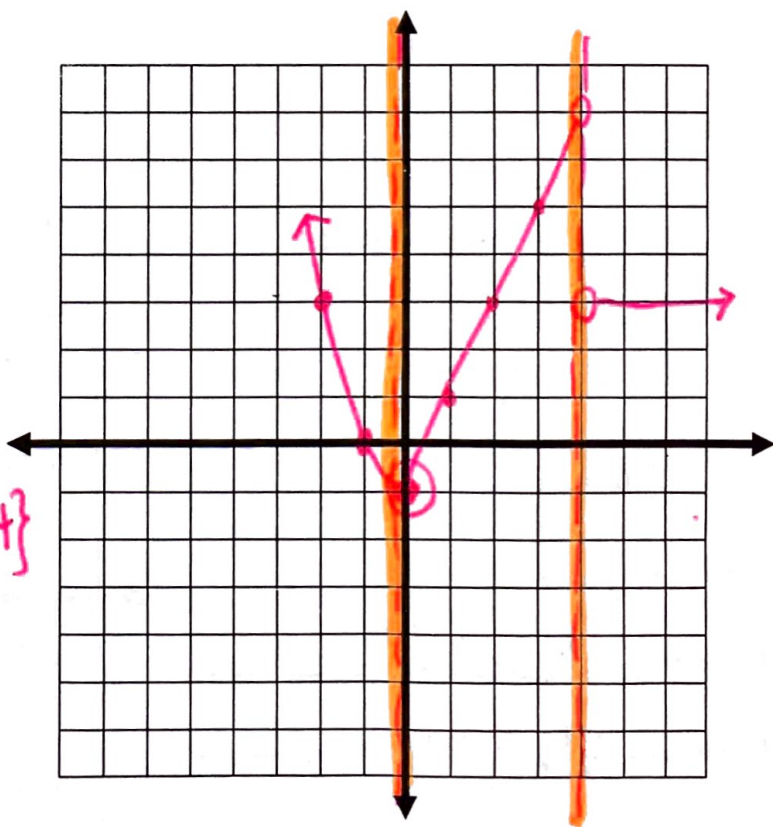
$$f(-2) = 3$$

$$f(0) = -1$$

$$f(5) = 3$$

$$\text{Domain: } \{x \mid x \leq 0 \cup 0 < x < 4 \cup x > 4\}$$

$$\text{Range: } \{y \mid y \neq -1\}$$



$$5. \quad f(x) = \begin{cases} x^2 & x \leq 0 \\ -x^2 + 4 & x > 0 \end{cases}$$

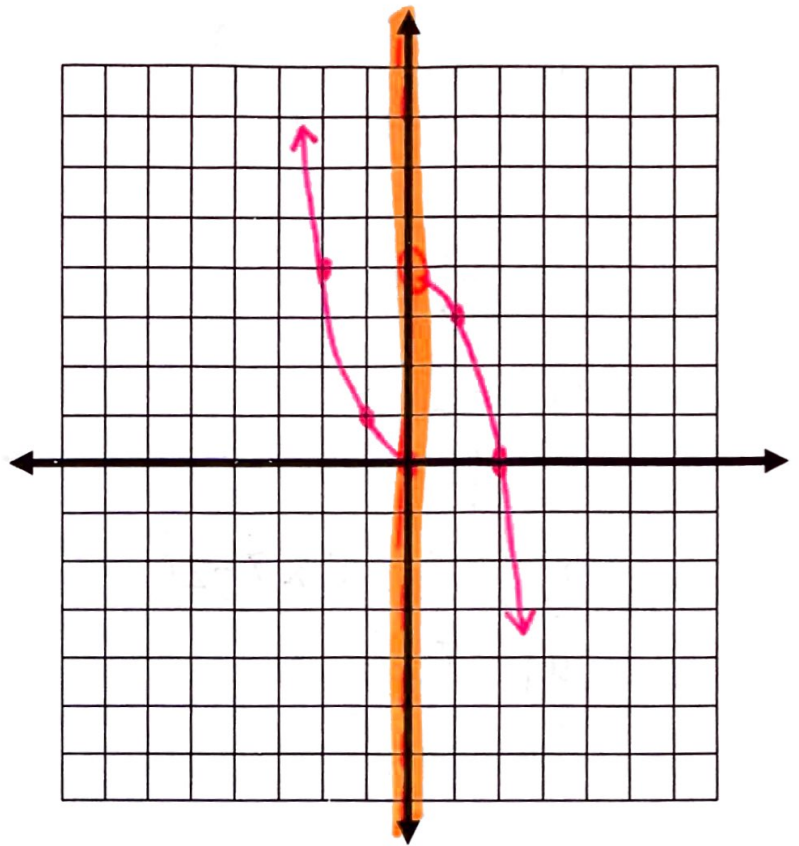
$$f(-4) = 16$$

$$f(0) = 0$$

$$f(3) = -5$$

$$\text{Domain: } \{x \mid x \in \mathbb{R}\}$$

$$\text{Range: } \{y \mid y \in \mathbb{R}\}$$



$$6. \quad f(x) = \begin{cases} 5 & x < -3 \\ -2x - 3 & x > -3 \end{cases}$$

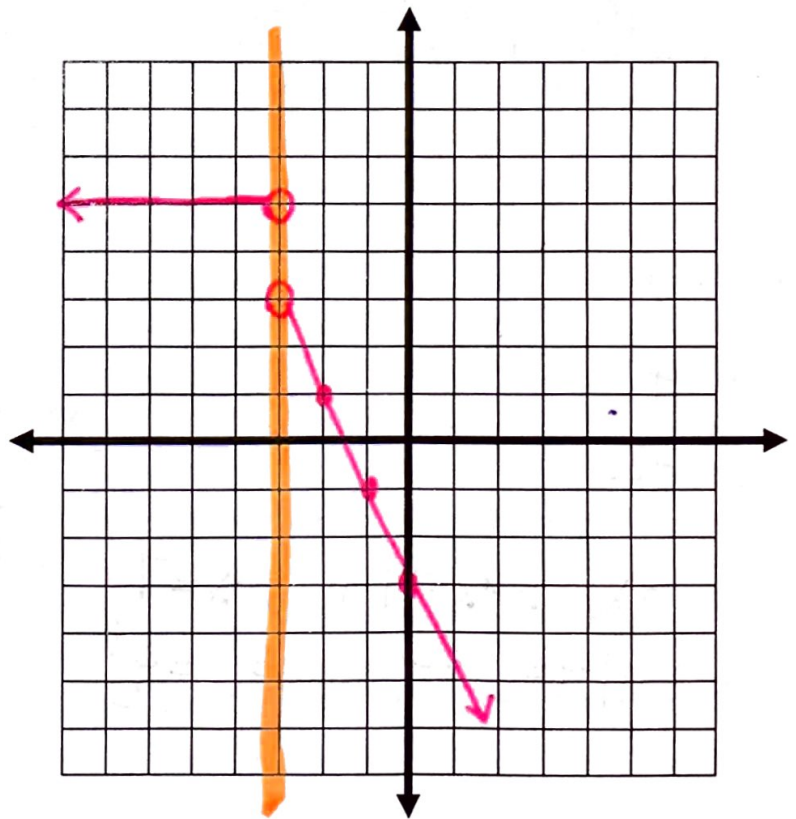
$$f(-4) = 5$$

$$f(0) = -3$$

$$f(3) = \emptyset$$

$$\text{Domain: } \{x \mid x \neq -3\}$$

$$\text{Range: } \{y \mid y < 3 \vee y = 5\}$$



$$7. f(x) = \begin{cases} -1, & \text{if } x \leq -3 \\ |x| - 2, & \text{if } -2 < x < 4 \\ \frac{1}{2}x, & \text{if } x \geq 4 \end{cases}$$

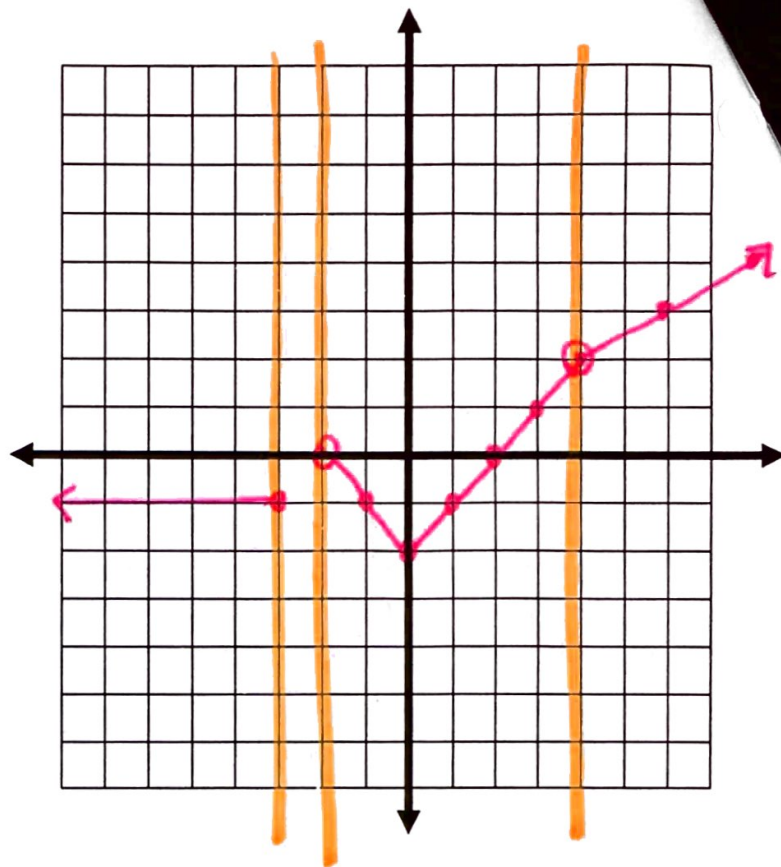
$$f(-4) = -1$$

$$f(0) = -2$$

$$f(3) = 1$$

$$\text{Domain: } \{x \mid x \leq -3 \vee -2 < x < 4\}$$

$$\text{Range: } \{y \mid y \geq -2\}$$



$$8. f(x) = \begin{cases} 0, & \text{if } -5 \leq x < -2 \\ -x^2 + 4, & \text{if } -2 \leq x \leq 1 \\ -x + 3, & \text{if } 4 < x \leq 7 \end{cases}$$

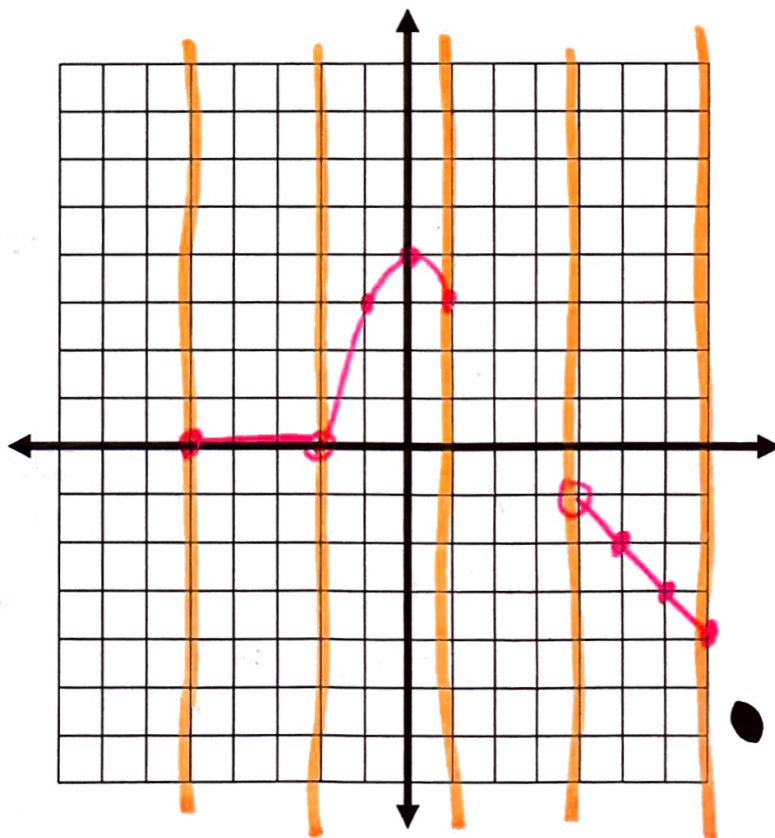
$$f(-2) = 0$$

$$f(0) = 4$$

$$f(5) = -2$$

$$\text{Domain: } \{x \mid -5 \leq x < -2 \vee -2 \leq x \leq 1 \vee 4 < x \leq 7\}$$

$$\text{Range: } \{y \mid -4 \leq y < -1 \vee 0 \leq y \leq 4\}$$



$$9. f(x) = \begin{cases} -2x-4 & \text{if } x < -2 \\ x^2-2 & \text{if } -2 \leq x < 1 \\ 2 & \text{if } x \geq 1 \end{cases}$$

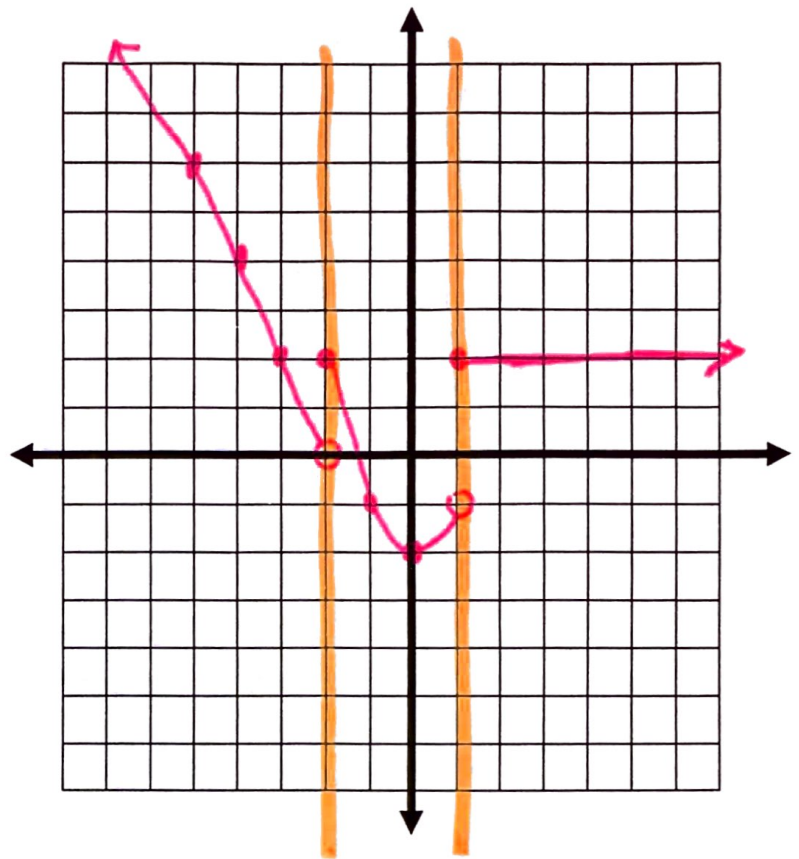
$$f(-4) = 4$$

$$f(0) = -2$$

$$f(3) = 2$$

$$\text{Domain: } \{x \mid x \in \mathbb{R}\}$$

$$\text{Range: } \{y \mid y \geq -2\}$$



$$10. f(x) = \begin{cases} 2, & \text{if } x < -1 \\ |x| + 3, & \text{if } -1 \leq x < 5 \\ \sqrt{2x-10}, & \text{if } x > 5 \end{cases}$$

$$f(-2) = 2$$

$$f(0) = 3$$

$$f(5) = \emptyset$$

$$\text{Domain: } \{x \mid x \neq 5\}$$

$$\text{Range: } \{y \mid y \geq 0\}$$

