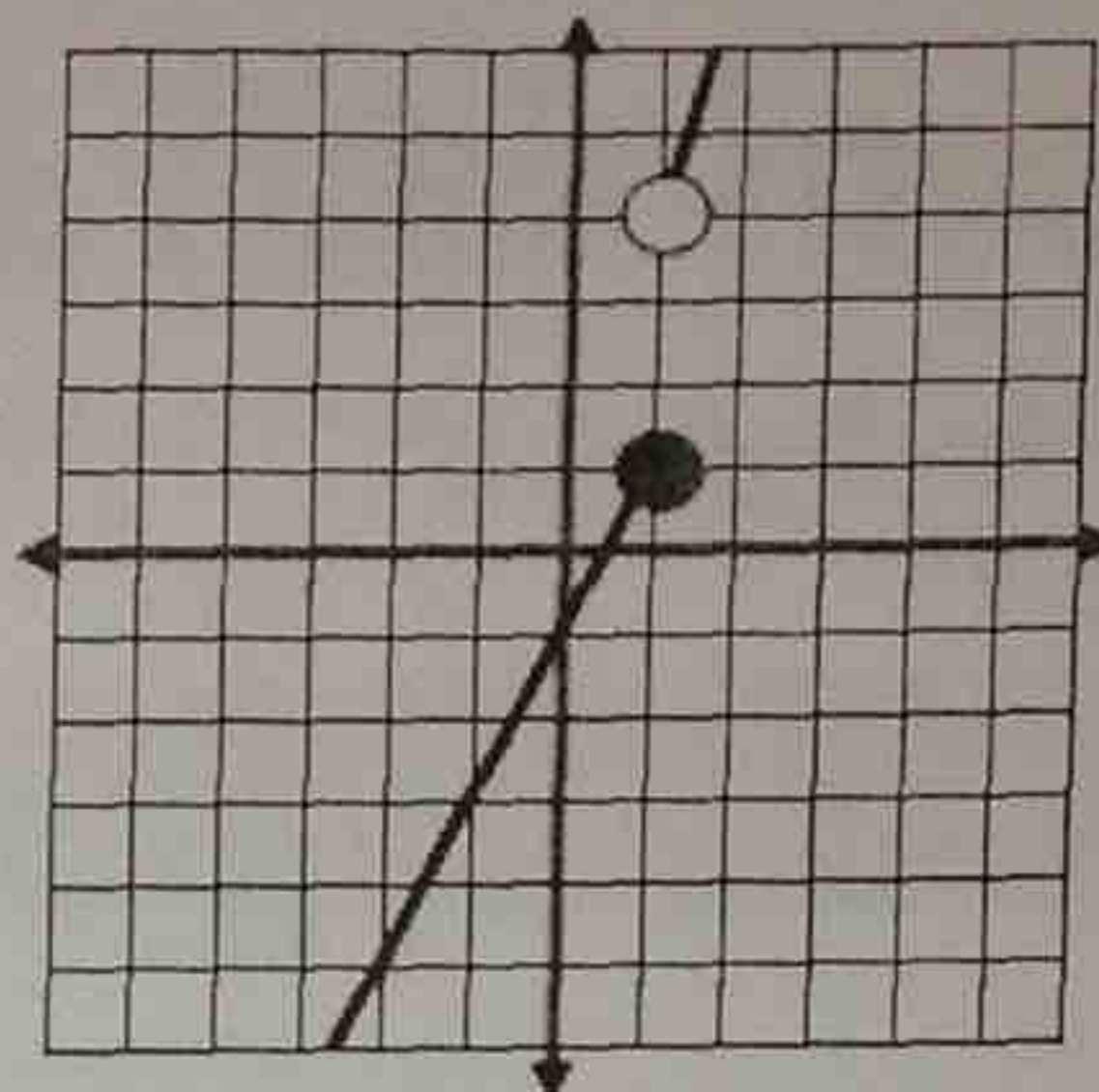


2.3 Piecewise Functions

SWBAT evaluate piecewise functions and graph piecewise functions on the coordinate plane.

Piecewise Functions: A function represented by sub-functions each corresponding to a specific domain.

Example:
$$\begin{cases} 2x - 1, & \text{if } x \leq 1 \\ 3x + 1, & \text{if } x > 1 \end{cases}$$



Evaluating a Piecewise Function Algebraically

Example 1: Evaluate $f(x)$ for each of the following.

$$f(x) = \begin{cases} x + 2, & \text{if } x < 2 \\ 2x + 1, & \text{if } x \geq 2 \end{cases}$$

a. $f(0) =$

$$0 + 2 = 2$$

$$(0, 2)$$

b. $f(2) =$

$$2(2) + 1 = 5$$

$$(2, 5)$$

c. $f(4) =$

$$2(4) + 1 = 9$$

$$(4, 9)$$

Example 2: Evaluate $f(x)$ for each of the following.

$$f(x) = \begin{cases} 2x + 8, & x \leq -2 \\ x^2 - 3, & -2 < x \leq 3 \\ \sqrt{x + 3}, & x > 3 \end{cases}$$

a. $f(-4) =$

$$2(-4) + 8 = 0$$

$$(-4, 0)$$

b. $f(6) =$

$$\sqrt{6+3} = \sqrt{9} = 3$$

$$(6, 3)$$

c. $f(-2) =$

$$2(-2) + 8 = 4$$

$$(-2, 4)$$

d. $f(0) =$

$$(0)^2 - 3 = -3$$

$$(0, -3)$$

You Try! Evaluate $f(x)$ for each of the following.

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

a. $f(8) =$

$$|8 - 2| = 6$$

$$(8, 6)$$

b. $f(0) =$

$$2(0)^2 - 1 = -1$$

$$(0, -1)$$

c. $f(4) =$

$$3$$

$$(4, 3)$$

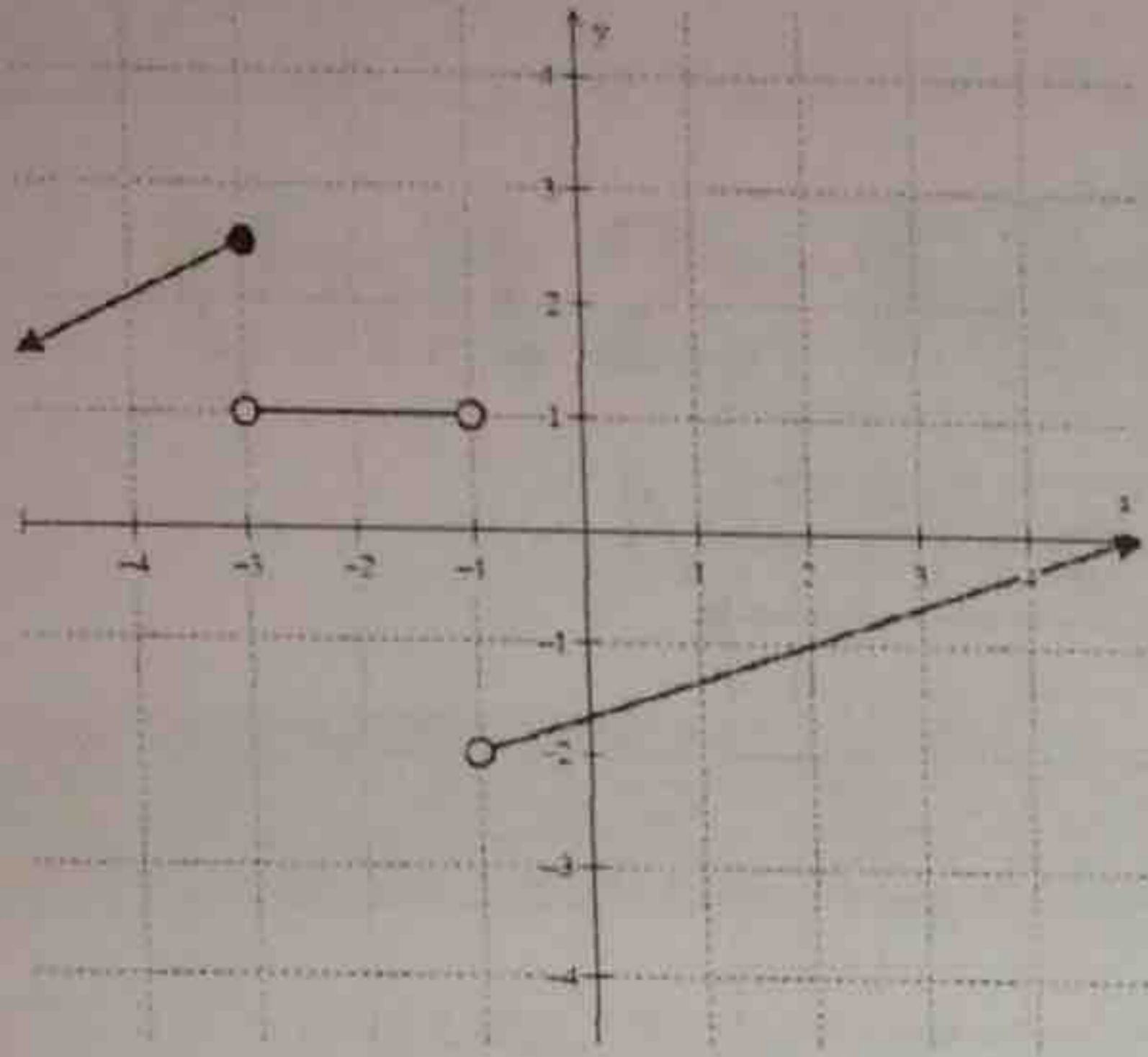
d. $f(5) =$

$$|5 - 2| = 3$$

$$(5, 3)$$

Evaluating a Piecewise Function Graphically

Example 3: Evaluate $f(x)$ for each of the following.



a. $f(2) = -1$

$(2, -1)$

b. $f(-3) = 2.5$

$(-3, 2.5)$

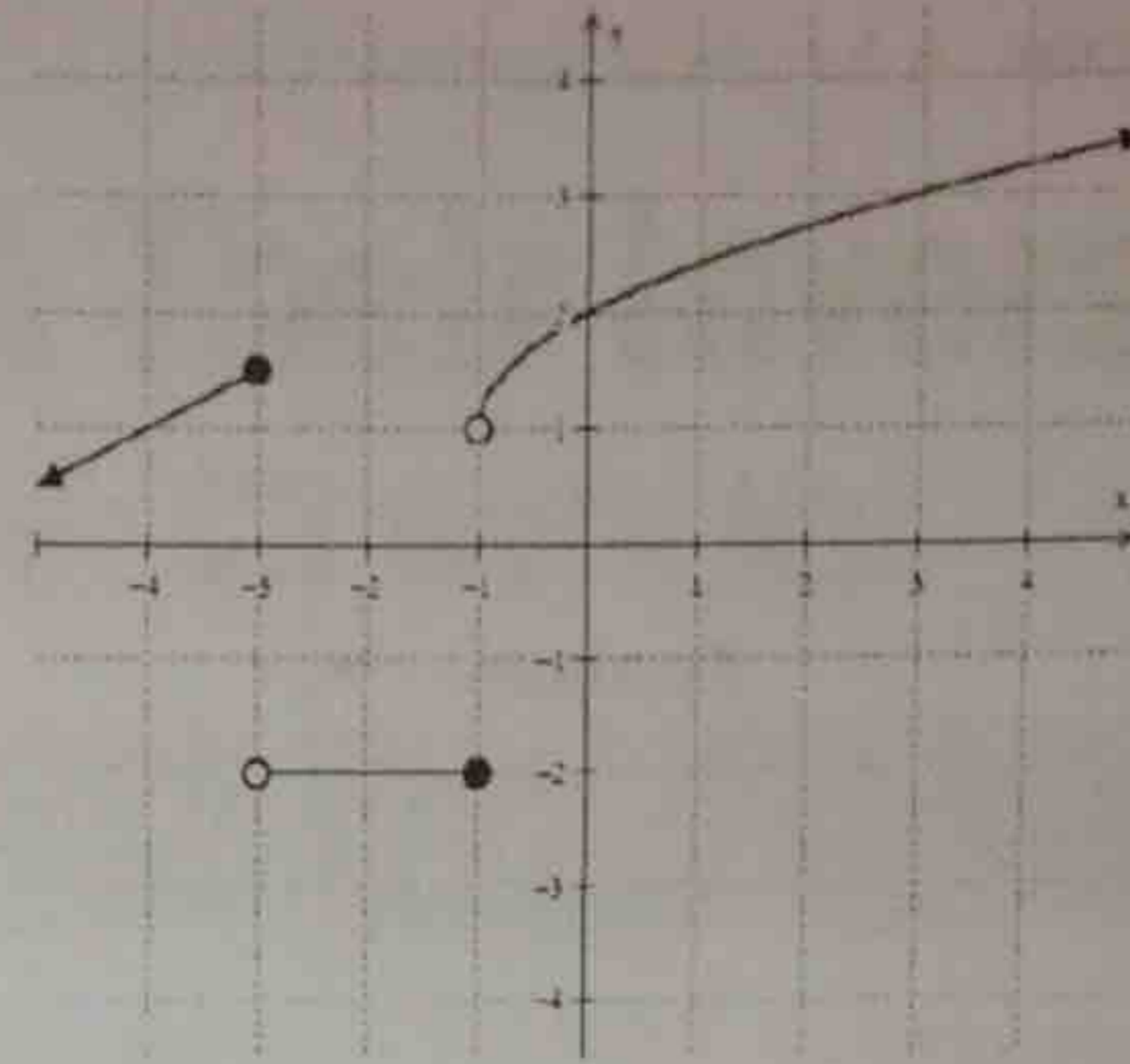
c. $f(-1) =$

\emptyset

d. $f(-4) = 2$

$(-4, 2)$

You Try! Evaluate $f(x)$ for each of the following.



a. $f(0) = 2$

$(0, 2)$

b. $f(-4) = 1$

$(-4, 1)$

c. $f(-1) = -2$

$(-1, -2)$

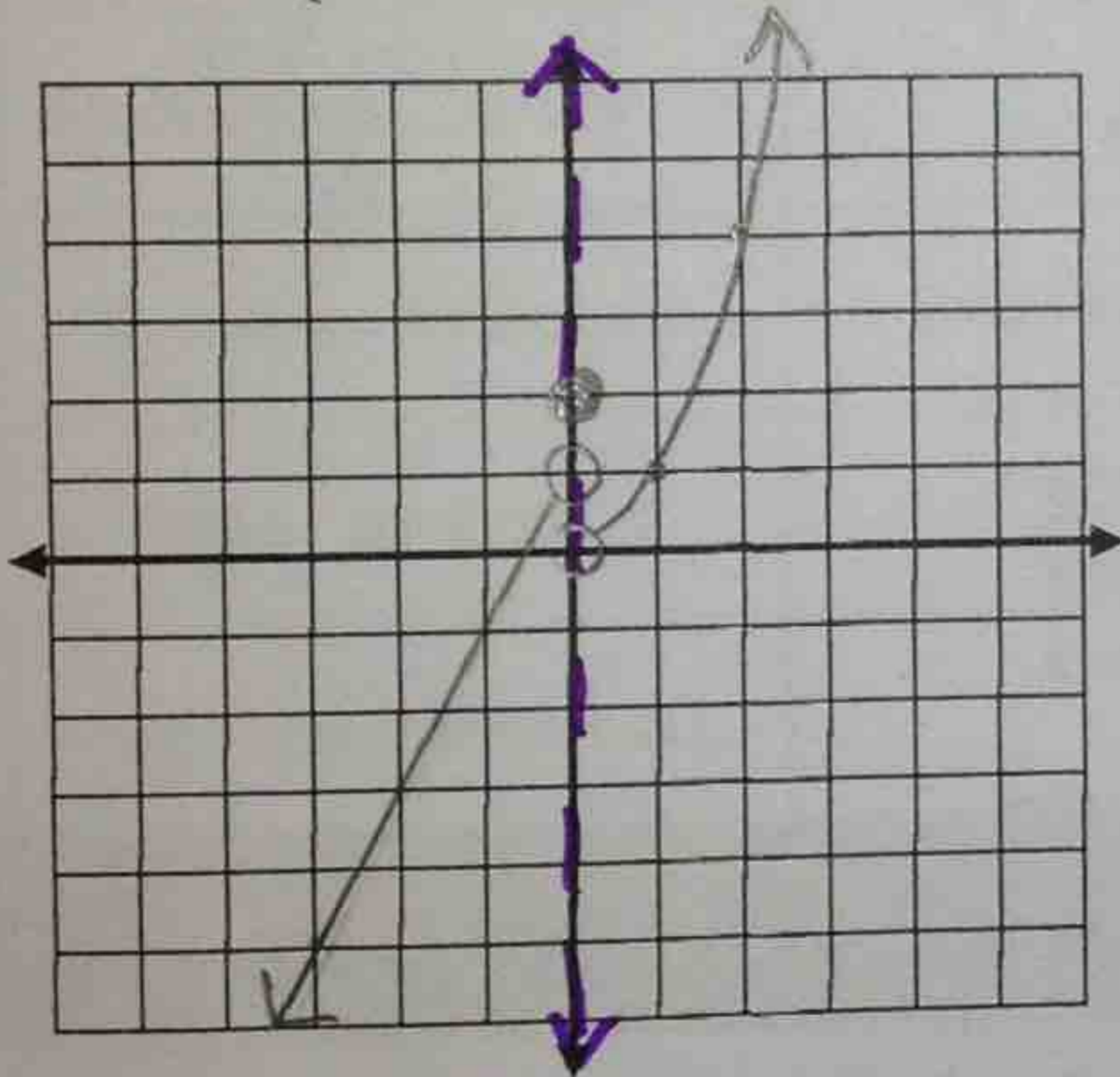
d. $f(3) = 3$

$(3, 3)$

Graphing Piecewise Functions

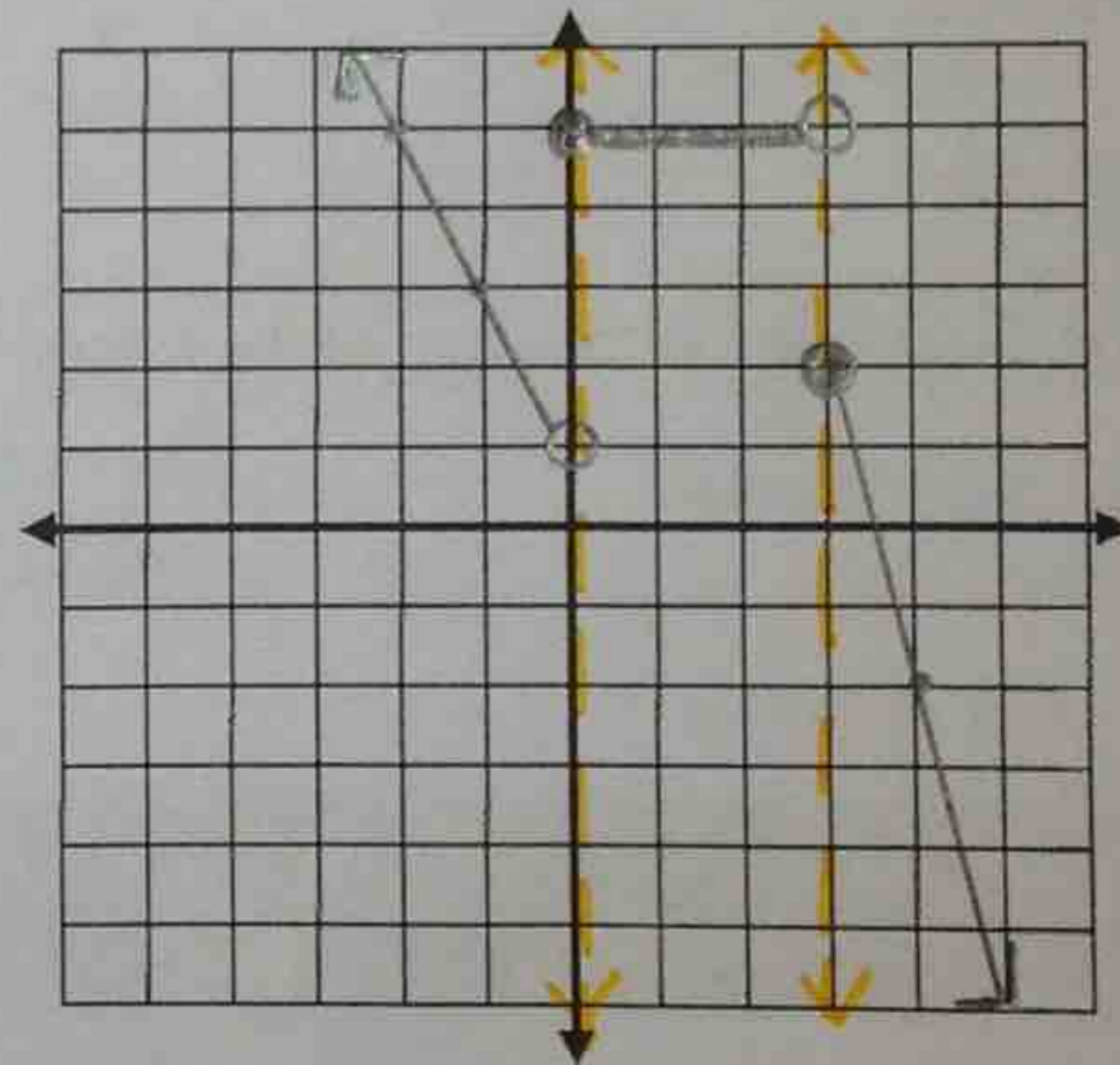
Example 4: Graph the following piecewise function.

$$f(x) = \begin{cases} x^2, & x \geq 0 \\ 2, & x = 0 \\ 2x + 1, & x < 0 \end{cases}$$



Example 5: Graph the following piecewise function.

$$f(x) = \begin{cases} -2x + 1, & x < 0 \\ 5, & 0 \leq x < 3 \\ -4x + 14, & x \geq 3 \end{cases}$$



You Try! Graph the following piecewise function.

$$f(x) = \begin{cases} 5, & x \leq 2 \\ 2x - 4, & x > 2 \end{cases}$$

