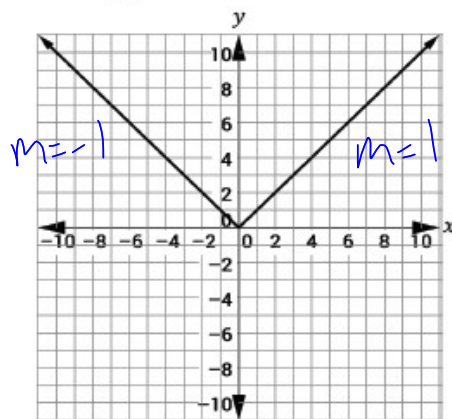


Section 3 – Topic 6
Absolute Value Functions

Consider the following piecewise-defined function.



vertex (0, 0)

Write the piecewise-defined function that represents the graph.

$$f(x) = \begin{cases} -x & x \leq 0 \\ x & x \geq 0 \end{cases}$$

What is the domain of the function?

$$(-\infty, \infty)$$

What is the range of the function?

$$[0, \infty)$$

What is the x -intercept of the graph?

$$(0, 0)$$

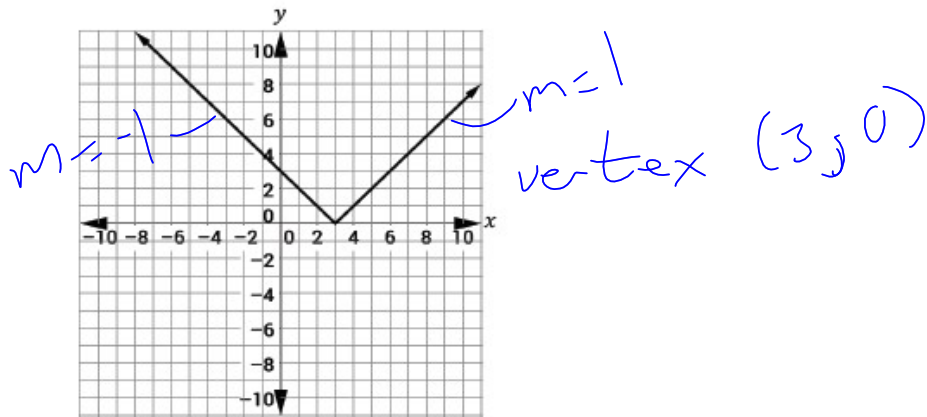
What is the y -intercept of the graph?

$$(0, 0)$$

- This graph is a special type of piecewise-defined function called an absolute value function.
- The equation of this function is written as $y = |x|$.
- The vertex of an absolute value function is either a relative maximum or relative minimum. Draw an example of each below.

Let's Practice!

1. Consider the following graph of an absolute value function.



- a. Write the function as a piecewise-defined function.

$$f(x) = \begin{cases} -x + 3 \\ x + 3 \end{cases}$$

- b. Which of the following absolute value functions represents the graph above?

$f(x) = |x + 3|$

$f(x) = |x - 3|$

- b. What is the vertex of the function?

$(3, 0)$

- c. What is the domain of the function?

$(-\infty, \infty)$

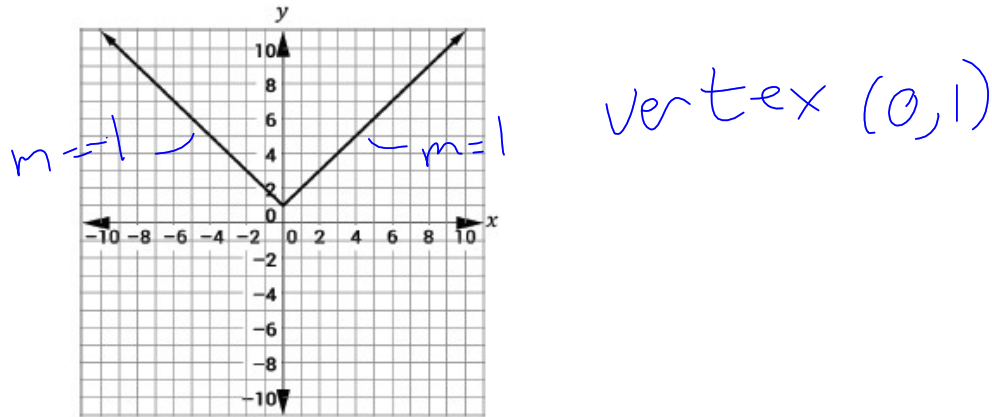
- d. What is the range of the function?

$[0, \infty)$

- e. What are the x- and y- intercept(s) of the function?

x-int $(3, 0)$ y-int $(0, 3)$

2. Consider the following graph of an absolute value function.



- a. Write the function as a piecewise-defined function.

$$f(x) = \begin{cases} -x + 1 & x \leq 0 \\ x + 1 & x \geq 0 \end{cases}$$

- b. Which of the following absolute value functions represents the graph above?

$f(x) = |x| + 1$ $f(x) = |x| - 1$

- c. What is the vertex of the graph?

$(0, 1)$

- d. Over which interval is the function increasing?

$(0, \infty)$

- e. Over which interval is the function decreasing?

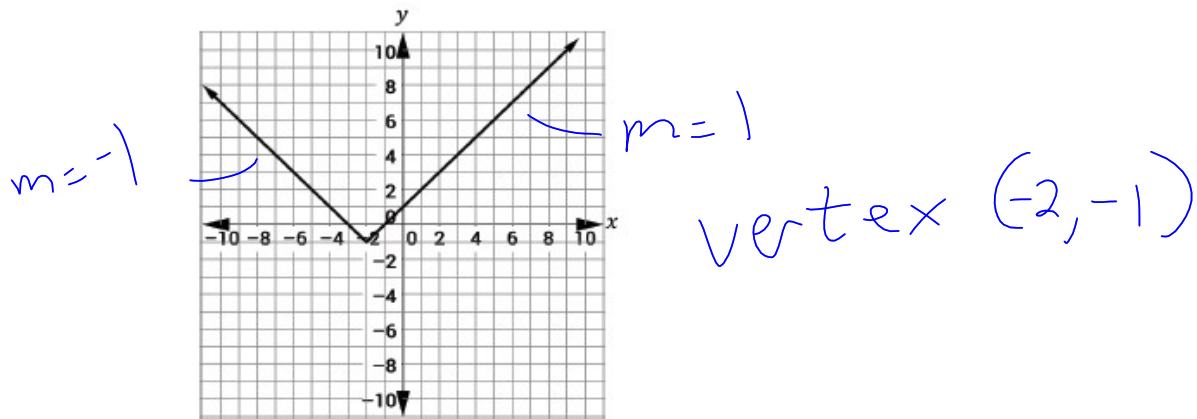
$(-\infty, 0)$

- f. What are the x- and y- intercept(s) of the function?

x -int = none $(0, 1)$ - y -int

Try It!

3. Consider the following graph of an absolute value function.



- a. Write the function as a piecewise-defined function.

$$f(x) = \begin{cases} -x + 1 & x \leq -2 \\ x + 1 & x \geq -2 \end{cases}$$

- b. Which of the following absolute value functions represents the graph above?

$$y = |x + 2| - 1$$

- c. Describe the relationship between the absolute value function and the vertex of the graph.

the vertex is where the two pieces intersect

- d. What is the line of symmetry of the graph?

$$x = -2$$

- e. What is the range of the graph?

$$[-1, \infty)$$

BEAT THE TEST!

1. Select whether the statement is always, sometimes, or never true.

Statement	Always	Sometimes	Never
An absolute value function is also a piecewise function.	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
A piecewise function is also an absolute value function.	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
The graph of an absolute value function has no x -intercepts.	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
The graph of an absolute value function has two y -intercepts.	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>
The graph of an absolute value function is decreasing.	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
The domain of an absolute value function is the set of all real numbers.	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
The range of an absolute value function is the set of all real numbers greater than or equal to zero.	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>