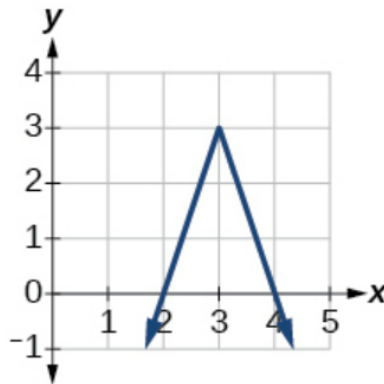


Exercise 65

For the following exercises, write an equation for the transformation of $f(x) = |x|$.

**Solution**

Notice that this graph of the absolute value function has not only been shifted to the right by 3 units and up by 3 units, but also has been reflected over the x -axis and vertically stretched by a factor of 3. Begin with the parent function.

$$|x|$$

Multiply it by -1 to reflect it over the x -axis.

$$-|x|$$

Multiply it by 3 to vertically stretch it by a factor of 3.

$$-3|x|$$

Replace x with $x - 3$ to shift the graph to the right by 3 units.

$$-3|x - 3|$$

Add 3 to shift the graph up by 3 units.

$$y = -3|x - 3| + 3$$