

## The Domain of the Composition of Two Functions

For each pair of functions  $f$  and  $g$  below, determine the domain of  $f(g(x))$ .

1.  $f(x) = x^2, g(x) = \sqrt{x}$

2.  $f(x) = \sqrt{x}, g(x) = x^2$

3.  $f(x) = \sqrt{x}, g(x) = x - 3$

4.  $f(x) = \frac{1}{x}, g(x) = x - 4$

5.  $f(x) = \frac{1}{x-1}, g(x) = \frac{1}{x}$

6.  $f(x) = \frac{1}{\sqrt{x}}, g(x) = \frac{1}{x-2}$

7.  $f(x) = \sqrt{x}, g(x) = x^2 + 2x$

## Determining Whether a Function is One-to-One

Determine whether each of the following functions is one-to-one.

1.  $f(x) = |x|$

2.  $f(x) = 3x - 8$

3.  $f(x) = |x - 4|$

4.  $f(x) = x^2 + 2$

5.  $f(x) = (x - 3)^2 + 4$

6.  $f(x) = x^3$

7.  $f(x) = x^2 + 2x - 8$

8.  $f(x) = \sqrt{9 - x^2}$

9.  $f(x) = x^4 - 4x + 3$

10.  $f(x) = x^3 - x$

11.  $f(x) = \sqrt{9 - x}$

12. 
$$f(x) = \begin{cases} x - 3 & \text{if } x < 2 \\ 4 - x & \text{if } 2 \leq x \leq 5 \\ x^2 & \text{if } x > 5 \end{cases}$$

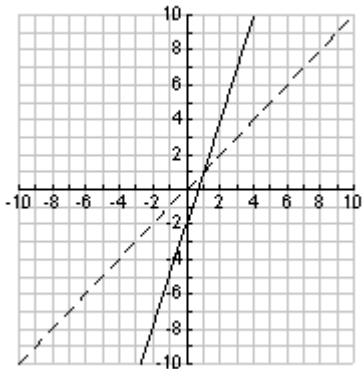
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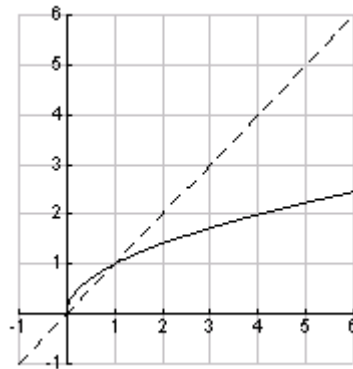
### The Inverse of a Function by Graphing

For each relation whose graph is shown below, sketch the graph of the inverse relation.

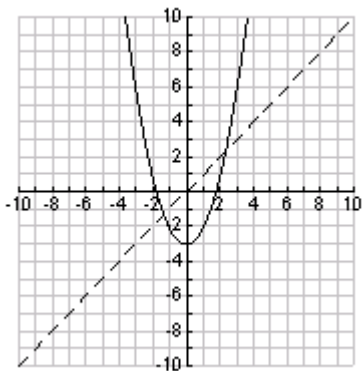
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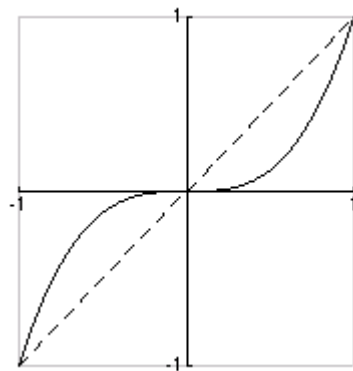
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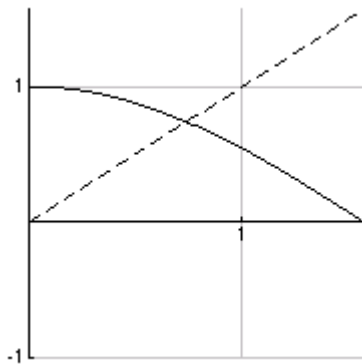
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**One-to-One Functions and Modifying the Domain of a Function So That Its Inverse is a Function.**

Determine if the following functions are one-to-one. If not, give at least one way of modifying the domain of the function so that its inverse is a function.

1.  $f(x) = |x|$

2.  $f(x) = 3x - 8$

3.  $f(x) = |x - 4|$

4.  $f(x) = x^2 + 2$

5.  $f(x) = (x - 3)^2 + 4$

6.  $f(x) = x^3$

7.  $f(x) = x^2 + 2x - 8$

8.  $f(x) = \sqrt{9 - x^2}$

9.  $f(x) = x^4 - 4x + 3$

## Transformations of Functions

Write the function rule in the form  $g(x) =$  for the following transformations of  $f(x)$ .

1.  $g(x)$  is the graph of  $f(x) = \sqrt{x}$  translated 3 units to the right.
2.  $g(x)$  is the graph of  $f(x) = x^2$  translated 4 units downward.
3.  $g(x)$  is the graph of  $f(x) = |x|$  translated three units left and two units up.
4.  $g(x)$  is the graph of  $f(x) = 3x$  reflected about the  $x$ -axis.
5.  $g(x)$  is the graph of  $f(x) = x^2 - 3$  reflected about the  $x$ -axis.
6.  $g(x)$  is the graph of  $f(x) = \sqrt{x}$  stretched vertically by a factor of 2.
7.  $g(x)$  is the graph of  $f(x) = |x|$  reflected about the  $y$ -axis.
8.  $g(x)$  is the graph of  $f(x) = x^2$  reflected about the  $x$ -axis and translated down 4 units.
9.  $g(x)$  is the graph of  $f(x) = |x|$  stretched vertically by a factor of 4.

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### Transformation of Functions II

Write the function  $g(x)$  in terms of  $f(x)$ .

1.  $g(x)$  is the graph of  $f(x)$  translated 5 units right.
2.  $g(x)$  is the graph of  $f(x)$  translated 2 units down.
3.  $g(x)$  is the graph of  $f(x)$  translated 4 units left and 6 units down.
4.  $g(x)$  is the graph of  $f(x)$  stretched vertically by a factor of 4.
5.  $g(x)$  is the graph of  $f(x)$  reflected about the  $x$ -axis, then translated up 2 units.
6.  $g(x)$  is the graph of  $f(x)$  reflected about the  $y$ -axis, then translated down 7 units.
7.  $g(x)$  is the graph of  $f(x)$  compressed (shrunk) vertically by a factor of 5, then reflected about the  $x$ -axis.
8.  $g(x)$  is the graph of  $f(x)$  reflected about the  $x$ -axis, then reflected about the  $y$ -axis.

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### The Graph of the Absolute Value Function

For #1 – 6, write the letter of the graph that represents each function.

1.  $f(x) = 2|x|$

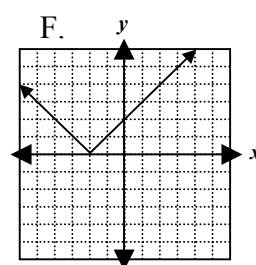
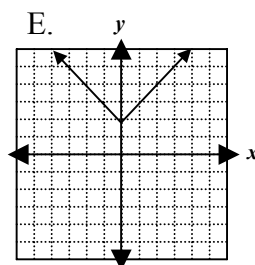
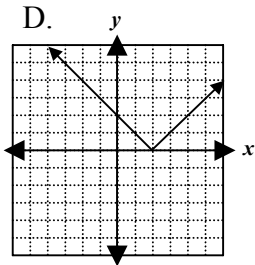
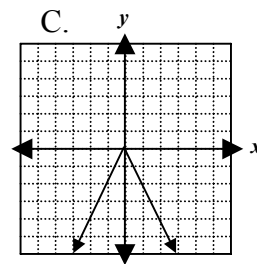
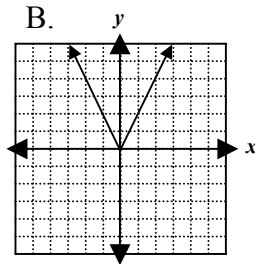
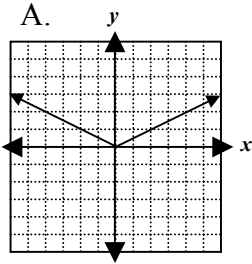
2.  $f(x) = -2|x|$

3.  $f(x) = \frac{1}{2}|x|$

4.  $f(x) = |x+2|$

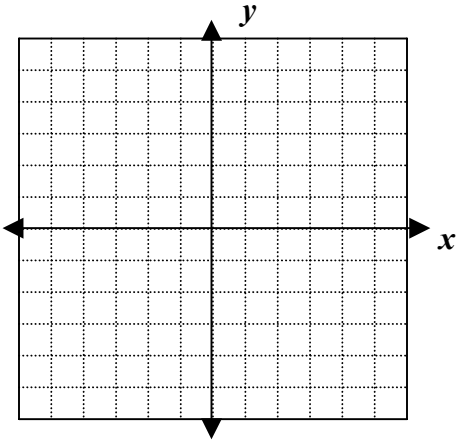
5.  $f(x) = |x|+2$

6.  $f(x) = |x-2|$

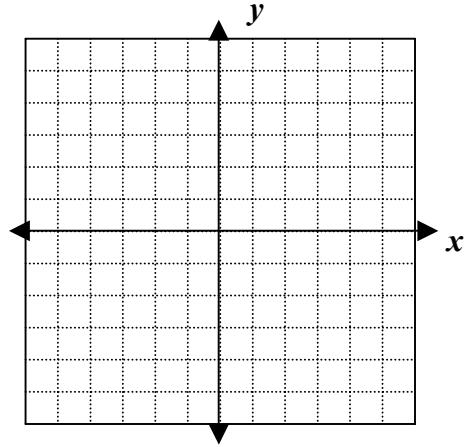


For 7 – 10 Sketch the graph of the function.

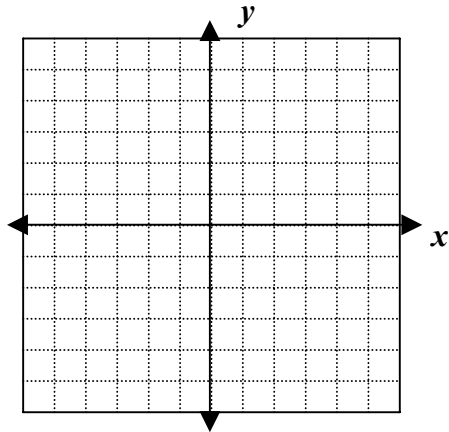
7.  $f(x) = |x - 1| + 3$



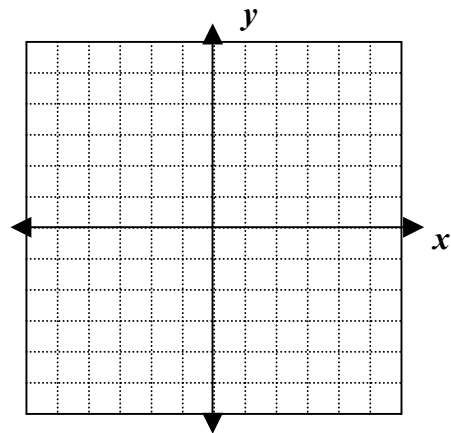
8.  $f(x) = -|x + 2| + 3$



9.  $f(x) = -\frac{1}{2}|x| + 4$



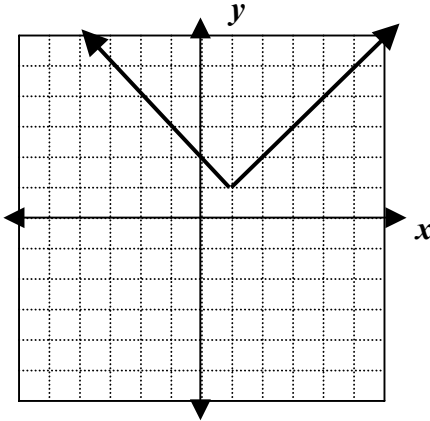
10.  $f(x) = 3|x - 1| - 2$



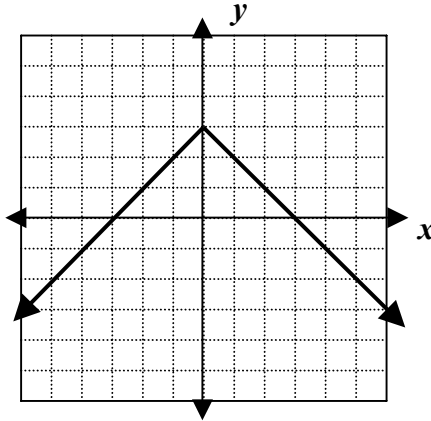
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Write a function rule for the following graphs.

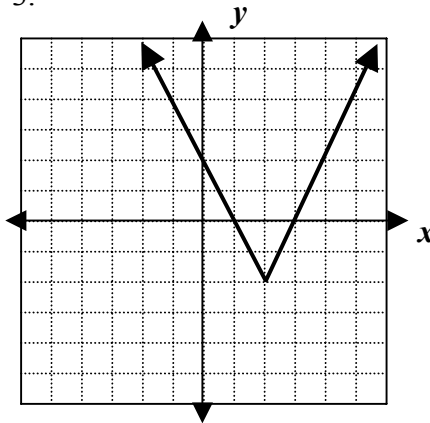
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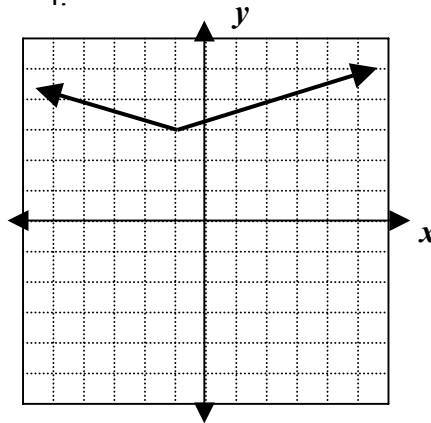
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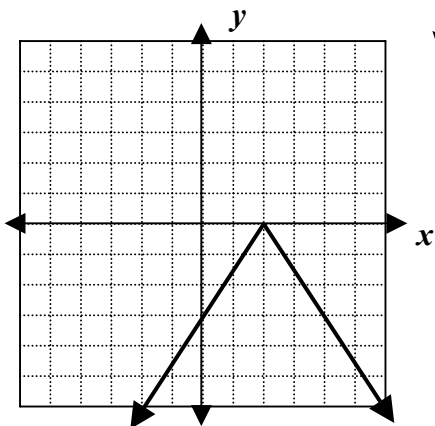
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6.

