Name: Date:
Instructor: Section:

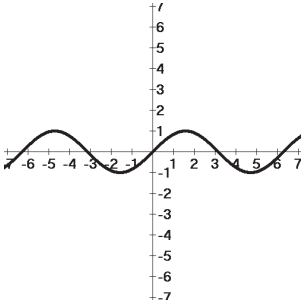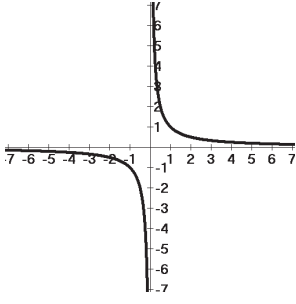## Practice Set 9.1

Use the choices to fill in each blank.

composite	vertical	interchange	domain
product	horizontal	one-to-one	range

1.   To determine if a relation is a function use the _____ line test.

2.   To determine if a function is one-to-one use the _____ line test.

3. $(f \cdot g)(x)$ is called the _____ of functions f and g.

4. $(f \circ g)(x)$ is called the _____ function of f with g.

5.   Only _____ functions have inverse functions.

6.   The domain of a one-to-one function becomes the _____ of its inverse function, and the range of the one-to-one function becomes the _____ of its inverse function.

For each pair of functions, find a) $(f \circ g)(x)$, b) $(f \circ g)(4)$, c) $(g \circ f)(x)$, d) $(g \circ f)(4)$.

7. $f(x) = x^2 + 1$,
     $g(x) = x - 1$

8. $f(x) = x^2 + 2x + 1$,
     $g(x) = x - 2$

7.a)_____ b)_____
 c)_____ d)_____

8.a)_____ b)_____
 c)_____ d)_____

9. $f(x) = 3x + 4$
     $g(x) = \dfrac{1}{x}$

10. $f(x) = x^2 + 5$
     $g(x) = \sqrt{x+1}$, $x \geq -1$

9.a)_____ b)_____
 c)_____ d)_____

10.a)_____ b)_____
 c)_____ d)_____

Determine whether each function is one-to-one.

11.

12.

11._____

12._____

13. $y = (x - 1)^2 + 3$

14. $y = |x + 1|$

13._____

14. _____

15. $y = \sqrt{x}$

16. $y = x^3$

15._____

16._____

17. $y = \pm\sqrt{x}$

18. $y = \sqrt[3]{x}$

17._____

18._____

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Practice Set 9.1

For each function, if it is one-to-one, find its inverse.

19. $f(x) = x + 1$ **20.** $f(x) = 3x + 4$ 19._____

                                                          20._____

21. $f(x) = x^2 + 2x + 1$ **22.** $f(x) = x^3 + 1$ 21._____

                                                          22._____

23. $f(x) = \sqrt[3]{x+1}$ **24.** $f(x) = \dfrac{2}{x}$ 23._____

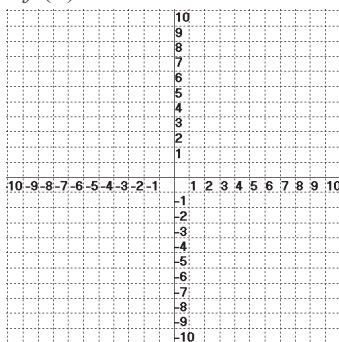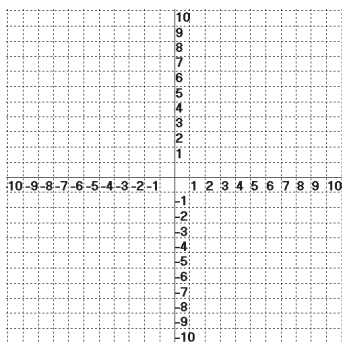   24. _____

For each one-to-one function, find $f^{-1}(x)$ and graph $f(x)$ and $f^{-1}(x)$ on the same axes.

25. $f(x) = -2x + 5$ **26.** $f(x) = \sqrt[3]{x}$ 25. $f^{-1}(x) =$_____

                                                          26. $f^{-1}(x) =$_____

For each pair of inverse functions, show that $(f \circ f^{-1})(x) = x$ and $(f^{-1} \circ f)(x) = x$.

27. $f(x) = 3x + 2$ **28.** $f(x) = x^2 - 1, x \geq 0$ 27. $(f \circ f^{-1})(x) =$_____

$\quad f^{-1}(x) = \dfrac{1}{3}x - \dfrac{2}{3}$ $\quad f^{-1}(x) = \sqrt{x+1}$

                                                          _____

                                                          $(f^{-1} \circ f)(x) =$_____

                                                          _____

                                                          28. $(f \circ f^{-1})(x) =$_____

                                                          _____

                                                          $(f^{-1} \circ f)(x) =$_____

                                                          _____

Problem Solving

29. The function $f(x) = 4x$ converts gallons, x, into quarts. Find the inverse function and explain what x and $f^{-1}(x)$ represent.

29. $f^{-1}(x) =$_____

$x =$_____

30. The function $f(x) = 16x$ converts pounds, x, into ounces. Find the inverse function and explain what x and $f^{-1}(x)$ represent.

30. $f^{-1}(x) =$_____

$x =$ _____

Challenge

31. When a pebble is thrown into a pond, the circle formed by the pebble hitting the water expands with time. The area of the expanding circle may be found by the formula $A = \pi r^2$. The radius, r in feet, of a circle is a function of time, t seconds. Suppose that the function is $r(t) = 2t$. Find the area of the circle at 2 seconds.

31._____