3.1 SECTION EXERCISES

VERBAL

1. What is the difference between a relation and a function?
2. What is the difference between the input and the output of a function?
3. Why does the vertical line test tell us whether the graph of a relation represents a function?
4. How can you determine if a relation is a one-to-one function?
5. Why does the horizontal line test tell us whether the graph of a function is one-to-one?

ALGEBRAIC

For the following exercises, determine whether the relation represents a function.

6. $\{(a, b), (c, d), (a, c)\}$
7. $\{(a, b),(b, c),(c, c)\}$

For the following exercises, determine whether the relation represents y as a function of x.

8. $5x + 2y = 10$
9. $y = x^2$
10. $x = y^2$
11. $3x^2 + y = 14$
12. $2x + y^2 = 6$
13. $y = -2x^2 + 40x$
14. $y = \dfrac{1}{x}$
15. $x = \dfrac{3y + 5}{7y - 1}$
16. $x = \sqrt{1 - y^2}$
17. $y = \dfrac{3x + 5}{7x - 1}$
18. $x^2 + y^2 = 9$
19. $2xy = 1$
20. $x = y^3$
21. $y = x^3$
22. $y = \sqrt{1 - x^2}$
23. $x = \pm\sqrt{1 - y}$
24. $y = \pm\sqrt{1 - x}$
25. $y^2 = x^2$
26. $y^3 = x^2$

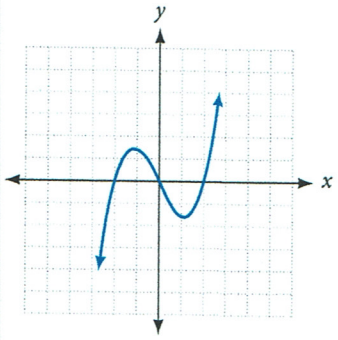
For the following exercises, evaluate the function f at the indicated values $f(-3), f(2), f(-a), -f(a), f(a + h)$.

27. $f(x) = 2x - 5$
28. $f(x) = -5x^2 + 2x - 1$
29. $f(x) = \sqrt{2 - x} + 5$
30. $f(x) = \dfrac{6x - 1}{5x + 2}$
31. $f(x) = |x - 1| - |x + 1|$
32. Given the function $g(x) = 5 - x^2$, simplify $\dfrac{g(x + h) - g(x)}{h}$, $h \neq 0$
33. Given the function $g(x) = x^2 + 2x$, simplify $\dfrac{g(x) - g(a)}{x - a}$, $x \neq a$
34. Given the function $k(t) = 2t - 1$:
    a. Evaluate $k(2)$.
    b. Solve $k(t) = 7$.
35. Given the function $f(x) = 8 - 3x$:
    a. Evaluate $f(-2)$.
    b. Solve $f(x) = -1$.
36. Given the function $p(c) = c^2 + c$:
    a. Evaluate $p(-3)$.
    b. Solve $p(c) = 2$.
37. Given the function $f(x) = x^2 - 3x$
    a. Evaluate $f(5)$.
    b. Solve $f(x) = 4$
38. Given the function $f(x) = \sqrt{x + 2}$:
    a. Evaluate $f(7)$.
    b. Solve $f(x) = 4$
39. Consider the relationship $3r + 2t = 18$.
    a. Write the relationship as a function $r = f(t)$.
    b. Evaluate $f(-3)$.
    c. Solve $f(t) = 2$.

GRAPHICAL

For the following exercises, use the vertical line test to determine which graphs show relations that are functions.

40.



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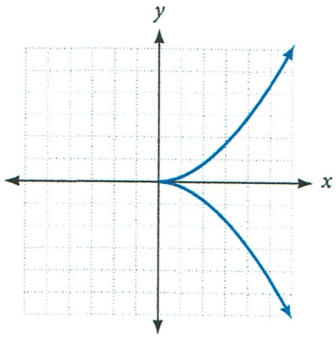

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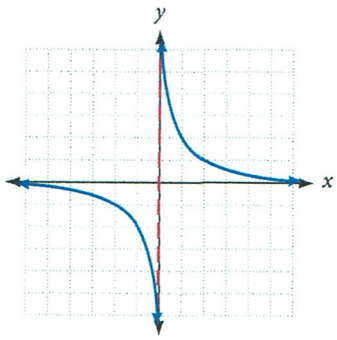

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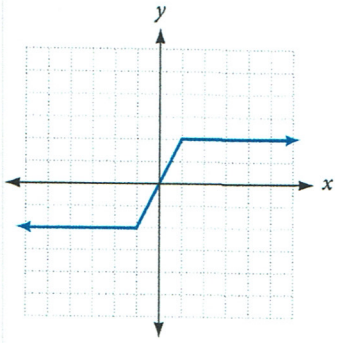

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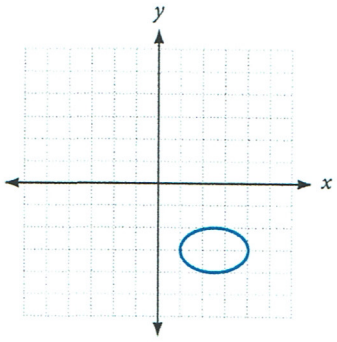

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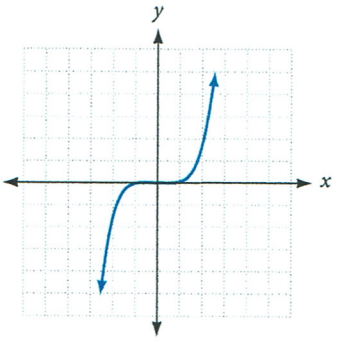

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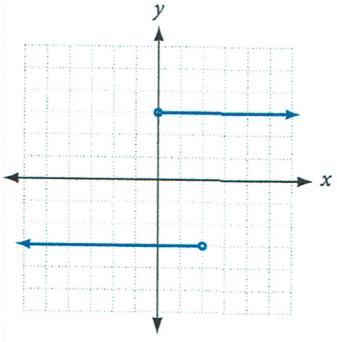

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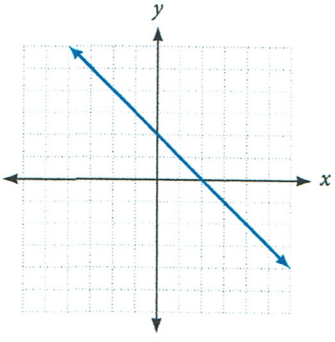

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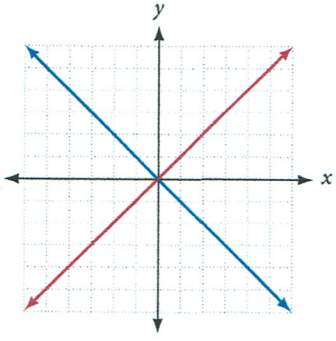

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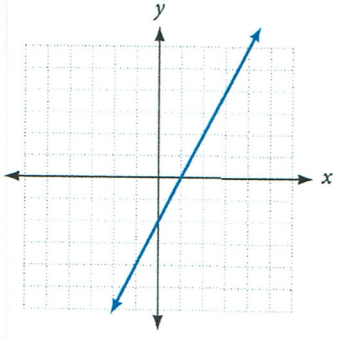

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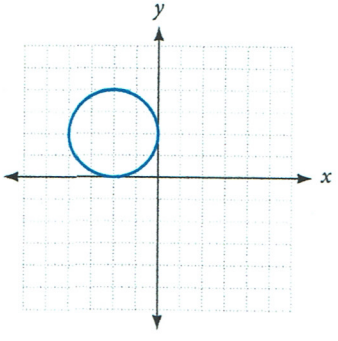

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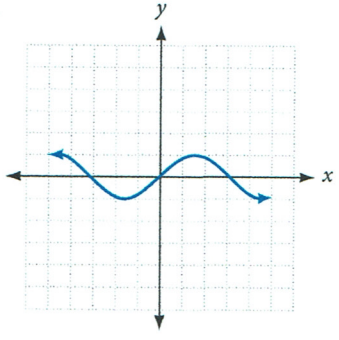
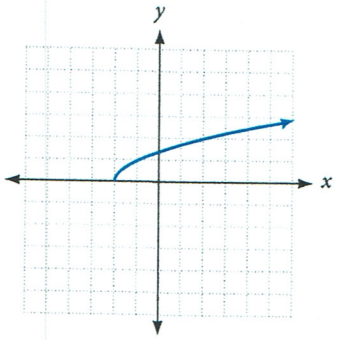


52. Given the following graph

a. Evaluate $f(-1)$.

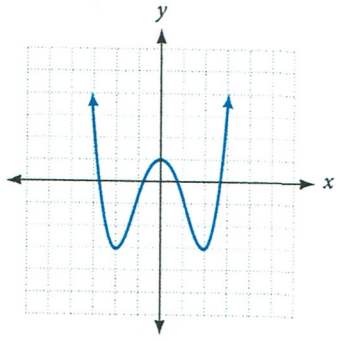
b. Solve for $f(x) = 3$.



53. Given the following graph

a. Evaluate $f(0)$.

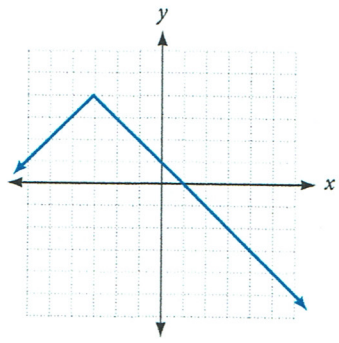
b. Solve for $f(x) = -3$.



54. Given the following graph

a. Evaluate $f(4)$.

b. Solve for $f(x) = 1$.



For the following exercises, determine if the given graph is a one-to-one function.

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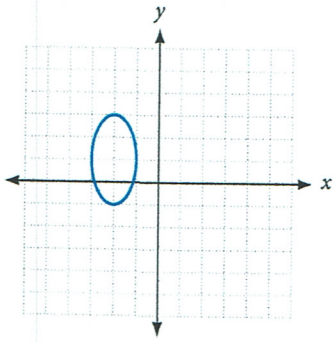

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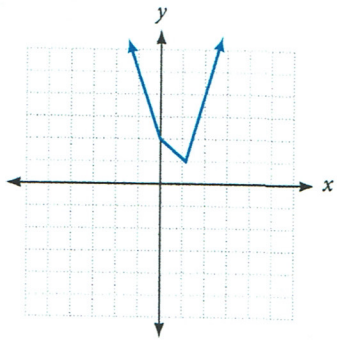

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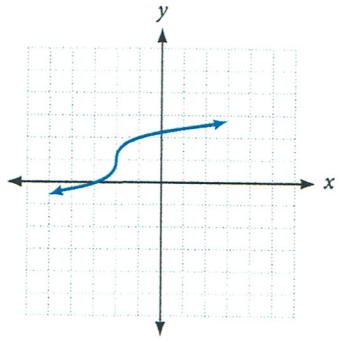

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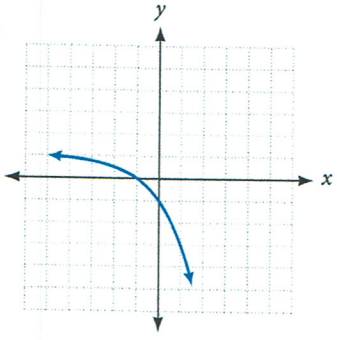

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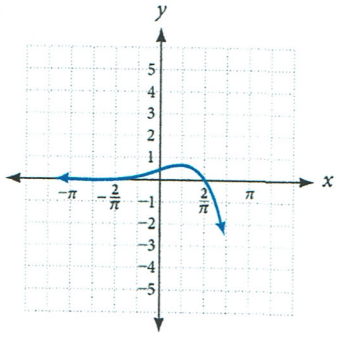

NUMERIC

For the following exercises, determine whether the relation represents a function.

60. $\{(-1,-1),(-2,-2),(-3,-3)\}$

61. $\{(3,4),(4,5),(5,6)\}$

62. $\{(2,5),(7,11),(15,8),(7,9)\}$

For the following exercises, determine if the relation represented in table form represents y as a function of x.

63.

x	5	10	15
y	3	8	14

64.

x	5	10	15
y	3	8	8

65.

x	5	10	10
y	3	8	14

For the following exercises, use the function f represented in **Table 14** below.

x	0	1	2	3	4	5	6	7	8	9
$f(x)$	74	28	1	53	56	3	36	45	14	47

Table 14

66. Evaluate $f(3)$.

67. Solve $f(x) = 1$