CHAPTER Test Prep VIDEOS

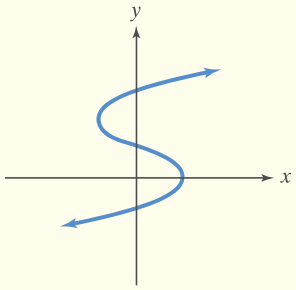
Chapter 1 Test

1. List by letter all relations that are not functions.

a. $\{(7, 5), (8, 5), (9, 5)\}$

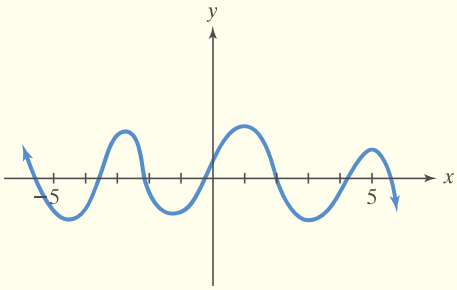
b. $\{(5, 7), (5, 8), (5, 9)\}$

c.

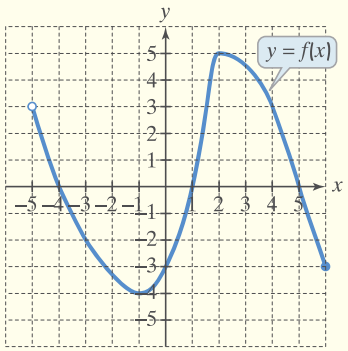


d. $x^2 + y^2 = 100$

e.



2. Use the graph of $y = f(x)$ to solve this exercise.



a. What is $f(4) - f(-3)$?

b. What is the domain of f?

c. What is the range of f?

d. On which interval or intervals is f increasing?

e. On which interval or intervals is f decreasing?

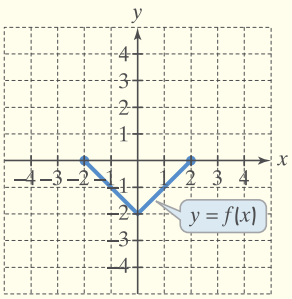
f. For what number does f have a relative maximum? What is the relative maximum?

g. For what number does f have a relative minimum? What is the relative minimum?

h. What are the x-intercepts?

i. What is the y-intercept?

3. Use the graph of $y = f(x)$ to solve this exercise.



a. What are the zeros of f?

b. Find the value(s) of x for which $f(x) = -1$.

c. Find the value(s) of x for which $f(x) = -2$.

d. Is f even, odd, or neither?

e. Does f have an inverse function?

f. Is $f(0)$ a relative maximum, a relative minimum, or neither?

g. Graph $g(x) = f(x + 1) - 1$.

h. Graph $h(x) = \frac{1}{2}f\left(\frac{1}{2}x\right)$.

i. Graph $r(x) = -f(-x) + 1$.

j. Find the average rate of change of f from $x_1 = -2$ to $x_2 = 1$.

In Exercises 4–15, graph each equation in a rectangular coordinate system. If two functions are indicated, graph both in the same system. Then use your graphs to identify each relation's domain and range.

4. $x + y = 4$

5. $x^2 + y^2 = 4$

6. $f(x) = 4$

7. $f(x) = -\frac{1}{3}x + 2$

8. $(x + 2)^2 + (y - 1)^2 = 9$

9. $f(x) = \begin{cases} 2 & \text{if } x \le 0 \\ -1 & \text{if } x > 0 \end{cases}$

10. $x^2 + y^2 + 4x - 6y - 3 = 0$

11. $f(x) = |x|$ and $g(x) = \frac{1}{2}|x + 1| - 2$

12. $f(x) = x^2$ and $g(x) = -(x - 1)^2 + 4$

13. $f(x) = 2x - 4$ and f^{-1}

14. $f(x) = x^3 - 1$ and f^{-1}

15. $f(x) = x^2 - 1, x \ge 0$, and f^{-1}

In Exercises 16–23, let $f(x) = x^2 - x - 4$ and $g(x) = 2x - 6$.

16. Find $f(x - 1)$.

17. Find $\dfrac{f(x + h) - f(x)}{h}$.

18. Find $(g - f)(x)$.

19. Find $\left(\dfrac{f}{g}\right)(x)$ and its domain.

20. Find $(f \circ g)(x)$.

21. Find $(g \circ f)(x)$.

22. Find $g(f(-1))$.

23. Find $f(-x)$. Is f even, odd, or neither?

In Exercises 69–72, begin by graphing the standard quadratic function, $f(x) = x^2$. Then use transformations of this graph to graph the given function.

69. $g(x) = x^2 + 2$

70. $h(x) = (x + 2)^2$

71. $r(x) = -(x + 1)^2$

72. $y(x) = \frac{1}{2}(x - 1)^2 + 1$

In Exercises 73–75, begin by graphing the square root function, $f(x) = \sqrt{x}$. Then use transformations of this graph to graph the given function.

73. $g(x) = \sqrt{x + 3}$

74. $h(x) = \sqrt{3 - x}$

75. $r(x) = 2\sqrt{x + 2}$

In Exercises 76–78, begin by graphing the absolute value function, $f(x) = |x|$. Then use transformations of this graph to graph the given function.

76. $g(x) = |x + 2| - 3$

77. $h(x) = -|x - 1| + 1$

78. $r(x) = \frac{1}{2}|x + 2|$

In Exercises 79–81, begin by graphing the standard cubic function, $f(x) = x^3$. Then use transformations of this graph to graph the given function.

79. $g(x) = \frac{1}{2}(x - 1)^3$

80. $h(x) = -(x + 1)^3$

81. $r(x) = \frac{1}{4}x^3 - 1$

In Exercises 82–84, begin by graphing the cube root function, $f(x) = \sqrt[3]{x}$. Then use transformations of this graph to graph the given function.

82. $g(x) = \sqrt[3]{x + 2} - 1$

83. $h(x) = -\sqrt[3]{2x}$

84. $r(x) = -2\sqrt[3]{-x}$

1.7

In Exercises 85–90, find the domain of each function.

85. $f(x) = x^2 + 6x - 3$

86. $g(x) = \dfrac{4}{x - 7}$

87. $h(x) = \sqrt{4 - x}$

88. $f(x) = \dfrac{x}{x^2 + 4x - 21}$

89. $g(x) = \dfrac{\sqrt{x - 2}}{x - 5}$

90. $f(x) = \sqrt{x - 1} + \sqrt{x + 5}$

In Exercises 91–93, find $f + g, f - g, fg$, and $\frac{f}{g}$. Determine the domain for each function.

91. $f(x) = 3x - 1, \quad g(x) = x - 5$

92. $f(x) = x^2 + x + 1, \quad g(x) = x^2 - 1$

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

In Exercises 94–95, find **a.** $(f \circ g)(x)$; **b.** $(g \circ f)(x)$; **c.** $(f \circ g)(3)$.

94. $f(x) = x^2 + 3, \quad g(x) = 4x - 1$

95. $f(x) = \sqrt{x}, \quad g(x) = x + 1$

In Exercises 96–97, find **a.** $(f \circ g)(x)$; **b.** *the domain of* $(f \circ g)$.

96. $f(x) = \dfrac{x + 1}{x - 2}, \quad g(x) = \dfrac{1}{x}$

97. $f(x) = \sqrt{x - 1}, \quad g(x) = x + 3$

In Exercises 98–99, express the given function h as a composition of two functions f and g so that $h(x) = (f \circ g)(x)$.

98. $h(x) = (x^2 + 2x - 1)^4$

99. $h(x) = \sqrt[3]{7x + 4}$

1.8

In Exercises 100–101, find $f(g(x))$ and $g(f(x))$ and determine whether each pair of functions f and g are inverses of each other.

100. $f(x) = \dfrac{3}{5}x + \dfrac{1}{2}$ and $g(x) = \dfrac{5}{3}x - 2$

101. $f(x) = 2 - 5x$ and $g(x) = \dfrac{2 - x}{5}$

The functions in Exercises 102–104 are all one-to-one. For each function,

a. *Find an equation for $f^{-1}(x)$, the inverse function.*

b. *Verify that your equation is correct by showing that $f(f^{-1}(x)) = x$ and $f^{-1}(f(x)) = x$.*

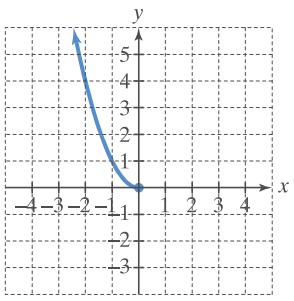
102. $f(x) = 4x - 3$

103. $f(x) = 8x^3 + 1$

104. $f(x) = \dfrac{2}{x} + 5$

Which graphs in Exercises 105–108 represent functions that have inverse functions?

105.



106.