

2.1 Functions and Their Representations

Basic Concepts
Representations of a Function
Definition of a Function
Identifying a Function
Tables, Graphs, and Calculators (Optional)

Key Terms

Use the vocabulary terms listed below to complete the statements in exercises 1-7.

range
function
independent
dependent
domain

symbolic representation
verbal representation
function notation
graphical representation
vertical line test
numerical representation

1. The notation $y = f(x)$ is called _____. The variable y is called the _____ variable and the variable x is called the _____ variable.
2. A sentence used to describe a function is a(n) _____.
3. A table of values is called a(n) _____ of a function.
4. A formula provides a(n) _____ of a function.
5. A(n) _____ of a function visually associates an x -input with a y -output.
6. A(n) _____ f is a set of ordered pairs (x, y) , where each x -value corresponds to exactly one y -value. The _____ of f is the set of all x -values, and the _____ of f is the set of all y -values.
7. To determine whether or not a graph represents a function, we can use the _____.

Representations of a Function

1. Write a function f that computes the 3% property tax on a home valued at x dollars. **1.** _____

2. Evaluate $f(\$230,000)$. **2.** _____

3. Let a function compute the number of inches in x feet. **3.**

Complete the table.

x (feet)	1	1.5		
y (inches)			24	48

4. Express the relation from exercise #3 in function notation. **4.** _____

Exercises 5-8: Evaluate each function at the given value of x .

5. $f(x) = 2x - 9$, $x = -3$ **5.** _____

6. $f(x) = \frac{-3x}{x-1}$, $x = 4$ **6.** _____

7. $f(x) = \sqrt{6x-2}$, $x = 3$ **7.** _____

8. $f(x) = 3x^2 + 1$, $x = -2$ **8.** _____

9. The median income I of a family in thousands of dollars from 2004 to 2007 can be approximated by $I(x) = 1.8(x - 2000) + 57$, where x is the year. Evaluate $I(2006)$ and interpret the result.

Exercises 10-12: Let a function f square the input x and then subtract 4 to obtain the output y .

10. Write a formula, or symbolic representation, for f .

10. _____

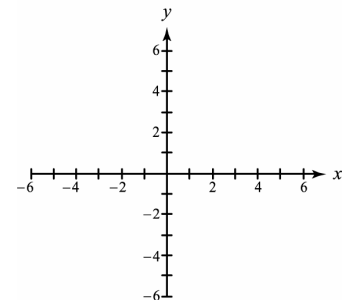
11. Make a table of values, or numerical representation, for f .

11.

x	-2	-1	0	1	2
y					

12. Sketch a graph, or graphical representation, of f .

12.



Definition of a Function

Exercises 13-14: Consider the following information.

The function f computes the average score on an algebra exam by the number of hours of study time. This function is defined by $f(1) = 68$, $f(3) = 77$, $f(5) = 84$, and $f(7) = 92$.

13. Write f as a set of ordered pairs.

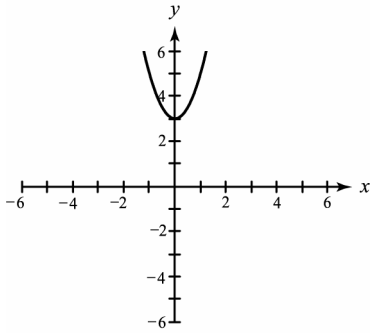
13. _____

14. Give the domain and range of f .

14. _____

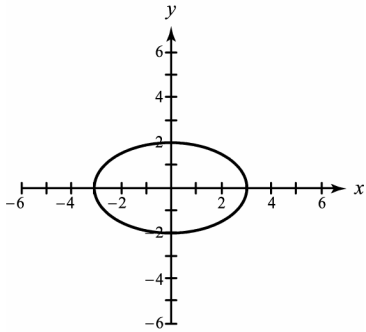
Exercises 15-18: Use the graph to find the domain and range of the relation. Note that the graph in exercise 16 does not represent a function.

15.



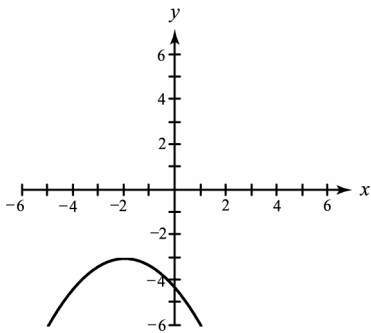
15. _____

16.



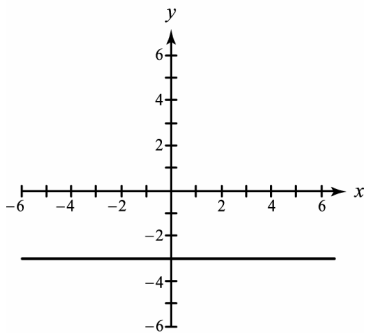
16. _____

17.



17. _____

18.



18. _____

Exercises 19-22: Use $f(x)$ to find the domain of f .

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

19. _____

20. $f(x) = \frac{x-3}{x}$

20. _____

21. $f(x) = \sqrt{x-4}$

21. _____

22. $f(x) = |-7x|$

22. _____

Identifying a Function

23. A relation pairs the eye color x of each patient with the patient's name. Does this relation determine a function?

23. _____

24. A relation pairs each student x with his/her zip code. Does this relations determine a function?

24. _____

Tables, Graphs, and Calculators (Optional)

Exercises 25-26: Determine whether the data in the table represent a function.

25.

x	2	1	-1	4	-1
y	0	-8	-2	-7	3

25. _____

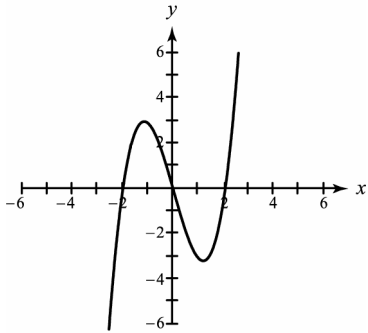
26.

x	3	0	-4	5	-2
y	1	-2	4	2	4

26. _____

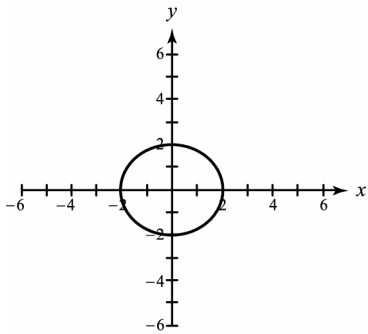
Exercises 27-30: Determine whether the graph represents a function.

27.



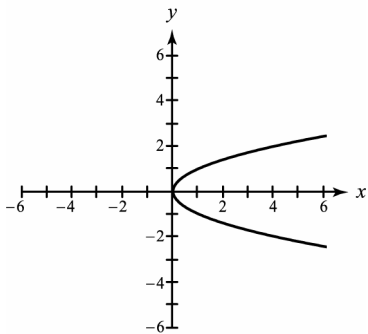
27. _____

28.



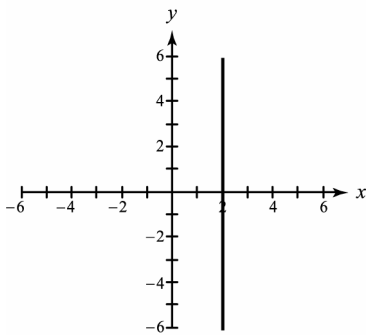
28. _____

29.



29. _____

30.



30. _____