

Section 5.R.9 Introduction to Functions

Go to Section 5.R.9 Learn mode in Hawkes to follow along!

Finding Domain and Range

Relation, Domain, and Range

A **relation** is a set of _____

The **domain, D** , of a relation is the set of _____

The **range, R** , of a relation is the set of _____

▮ Example 1 Finding the Domain and Range

Find the domain and range for each of the following relations.

a. $g = \{(5, 7), (6, 2), (6, 3), (-1, 2)\}$

b. $f = \{(-1, 1), (1, 5), (0, 3)\}$

Solution

Exercises

State the domain and range of each relation.

1. $f = \{(0, 0), (1, 6), (4, -2), (-3, 5), (2, -1)\}$

3. $f = \{(-3, -3), (0, 1), (-2, 1), (3, 1), (5, 1)\}$

2. $g = \{(-4, 4), (-3, 4), (1, 4), (2, 4), (3, 4)\}$

4. $s = \{(0, 2), (-1, 1), (2, 4), (3, 5), (-3, 5)\}$

Identifying Functions

Functions

A **function** is a relation in which _____

▮ Example 3 Determining if a Relation is a Function

Determine whether each of the following relations is a function.

a. $s = \{(2, 3), (1, 6), (2, \sqrt{5}), (0, -1)\}$

b. $t = \{(1, 5), (3, 5), (\sqrt{2}, 5), (-1, 5), (-4, 5)\}$

Solution

Exercises

Determine whether each relation is a function.

5. $h = \{(1, -5), (2, -3), (-1, -3), (0, 2), (4, 3)\}$

7. $f = \{(-1, 4), (-1, 2), (-1, 0), (-1, 6), (-1, -2)\}$

6. $t = \{(-1, -4), (0, -3), (2, -1), (4, 1), (1, 1)\}$

8. $g = \{(0, 0), (-2, -5), (2, 0), (4, -6), (5, 2)\}$

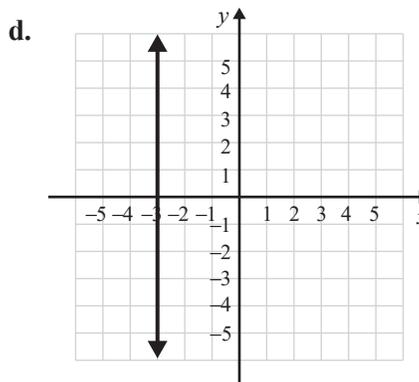
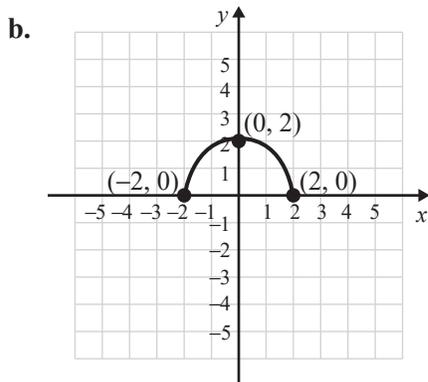
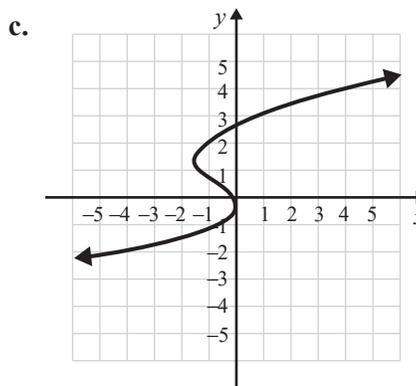
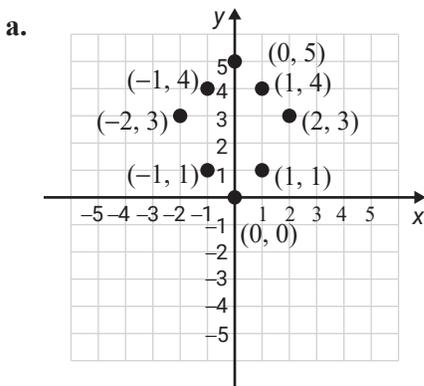
Vertical Line Test

Vertical Line Test

If any vertical line intersects the graph of a relation at more than one point, then the relation is

Example 4 Using the Vertical Line Test

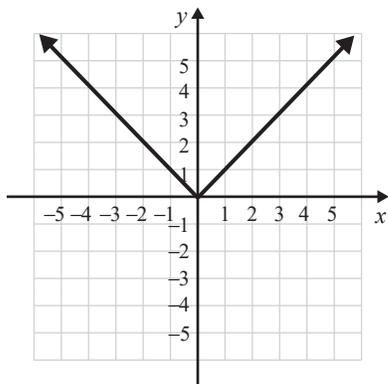
Use the vertical line test to determine whether each graph represents a function. Then list the domain and range of each graph.



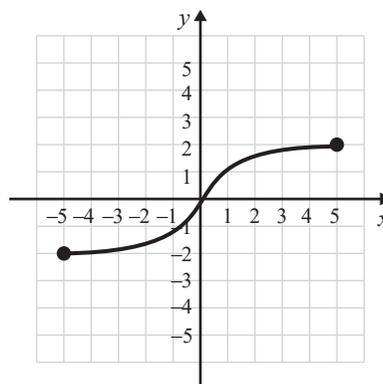
Exercises

Use the vertical line test to determine whether each graph represents a function. State the domain and range using interval notation.

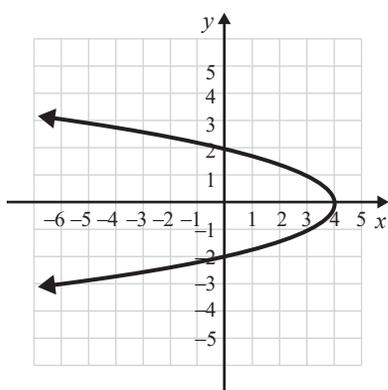
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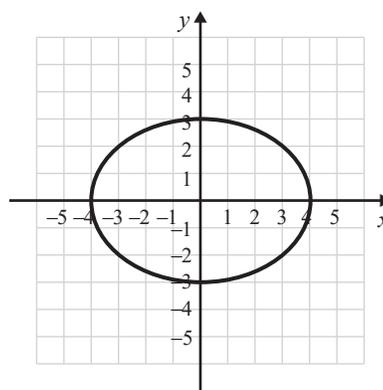
11.



10.



12.



Finding Domains of Functions

Linear Function

A linear function is a function represented by an equation of the form

The domain of a linear function is _____

Now for the nonlinear function

$$y = \frac{2}{x-1}$$

we say that the domain (all possible values for x) is every real number for which the expression

$\frac{2}{x-1}$ is _____. Because the denominator cannot be 0, the domain consists of all real numbers _____. That is, $D =$ _____ or simply $x \neq$ _____.

Example 5 Finding the Domain of a Function

Find the domain for the function $y = \frac{2x+1}{x-5}$.

Solution

Exercises

State the domain of each function.

13. $y = -5x + 10$

15. $g(x) = \frac{8}{x}$

17. $y = \frac{13x^2 - 5x + 8}{x - 3}$

14. $2x + y = 14$

16. $h(x) = \frac{7}{3x}$

18. $f(x) = \frac{35}{x-6}$

Function Notation

In function notation, instead of writing y , write _____, read “ f of x .”

▣ Example 6 Evaluating Functions

For the function $g(x) = 4x + 5$, find:

a. $g(2)$

b. $g(-1)$

c. $g(0)$

Solution

Exercises

Find the values of the functions as indicated.

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

a. $f(2)$

b. $f(-2)$

c. $f(0)$

20. $g(x) = -4x + 7$

a. $g(-3)$

b. $g(6)$

c. $g(0)$

21. $G(x) = x^2 + 5x + 6$

a. $G(-2)$

b. $G(1)$

c. $G(5)$

22. $h(x) = x^3 - 8x$

a. $h(-3)$

b. $h(0)$

c. $h(3)$