Discrete and Continuous Domains

Sometimes the set of points that represent the solutions of an equation are distinct, and other times the points are connected.

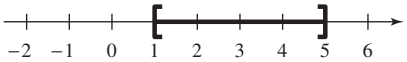
Discrete and Continuous Domains

A **discrete domain** is a set of input values that consists of only certain numbers in an interval.

EXAMPLE: Integers from 1 to 5

A **continuous domain** is a set of input values that consists of all numbers in an interval.

EXAMPLE: All numbers from 1 to 5



Study Tip

The domain of a function depends on the real-life context of the function, not just the equation that represents the function.

EXAMPLE Identifying Discrete and Continuous Domains

For each situation, identify the independent and dependent variables. Then find the domain of the function and determine whether it is discrete or continuous.

a. The function $C = 29.95t$ represents the total cost C (in dollars) of t tickets for a concert. Each fan can buy a maximum of six tickets.

b. The function $y = -0.01x^2 + 4x$ represents the path of a soccer ball, where x is the horizontal distance (in yards) and y is the corresponding height (in yards).

SOLUTION

a. The total cost C of the tickets depends on the number t of tickets you buy. So, C is the dependent variable, and t is the independent variable.

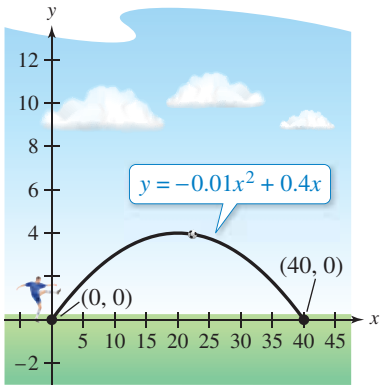
You cannot buy part of a ticket, only a certain number of tickets. Because t represents the number of tickets, it must be a whole number. The maximum number of tickets a customer can buy is six.

So, the domain is 0, 1, 2, 3, 4, 5, and 6, and it is discrete.

b. The variable y is the dependent variable, and x is the independent variable.

The x-intercepts of the graph of $y = -0.01x^2 + 0.4x$ are (0, 0) and (40, 0). The horizontal distance can be any number greater than or equal to 0 and less than or equal to 40.

So, the domain is $0 \leq x \leq 40$, and it is continuous.



Exercises Within Reach®

Identifying Discrete and Continuous Domains **In Exercises 1 and 2, identify the independent and dependent variables. Then find the domain of the function and determine whether it is discrete or continuous.**

1. You are pumping water out of a flooded basement. The function $A = 6575 - 50m$ represents the amount A (in gallons) of water remaining in the basement after m minutes.

2. You are reserving hotel rooms for a basketball team. The function $C = 95r$ represents the total cost C (in dollars) of reserving r rooms for one night.