Section 3.6 Functions

# Objective 1: Identifying Relations, Domains, and Ranges

In previous sections, we have discussed relationships between two quantities. For example, the relationship between the length of the side of a square and its area is described by the equation .

A set of ordered pairs is called a **relation**. The set of all -coordinates is called the **domain** of a relation, and the set of all -coordinates is called the **range** of a relation. Equations such as are also called relations since equations in two variables define a set of ordered pair solutions.

# Objective 2: Identifying Functions

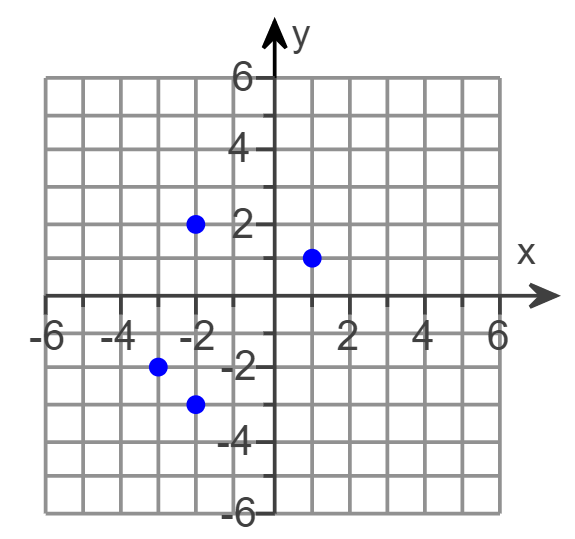
Some relations are also **functions**. A function is a set of ordered pairs that assigns to each -value exactly one -value.

State the domain and range of the given relation. Then determine if the relation is also a function.

|  |  |
| --- | --- |
| a. | b. |

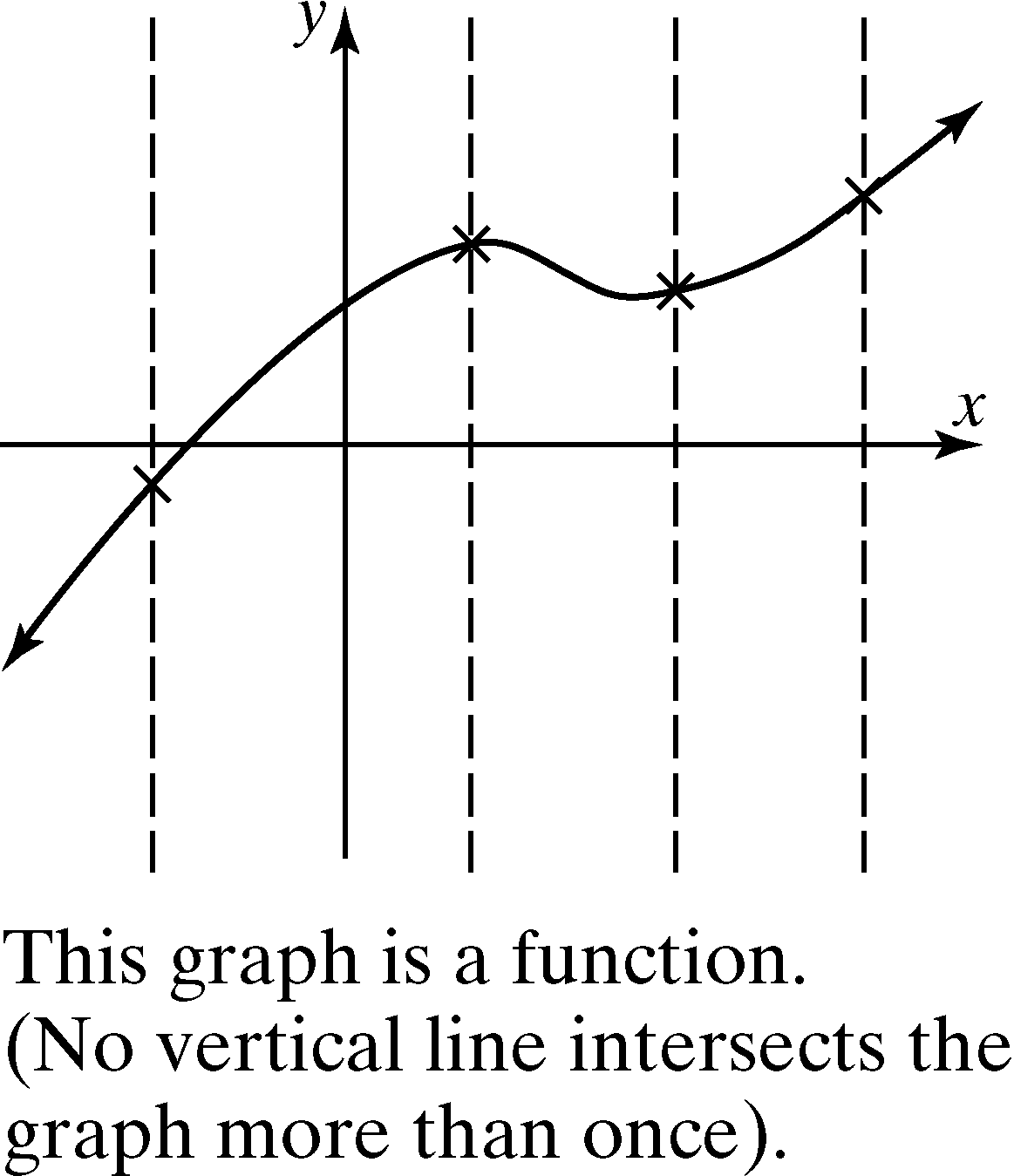
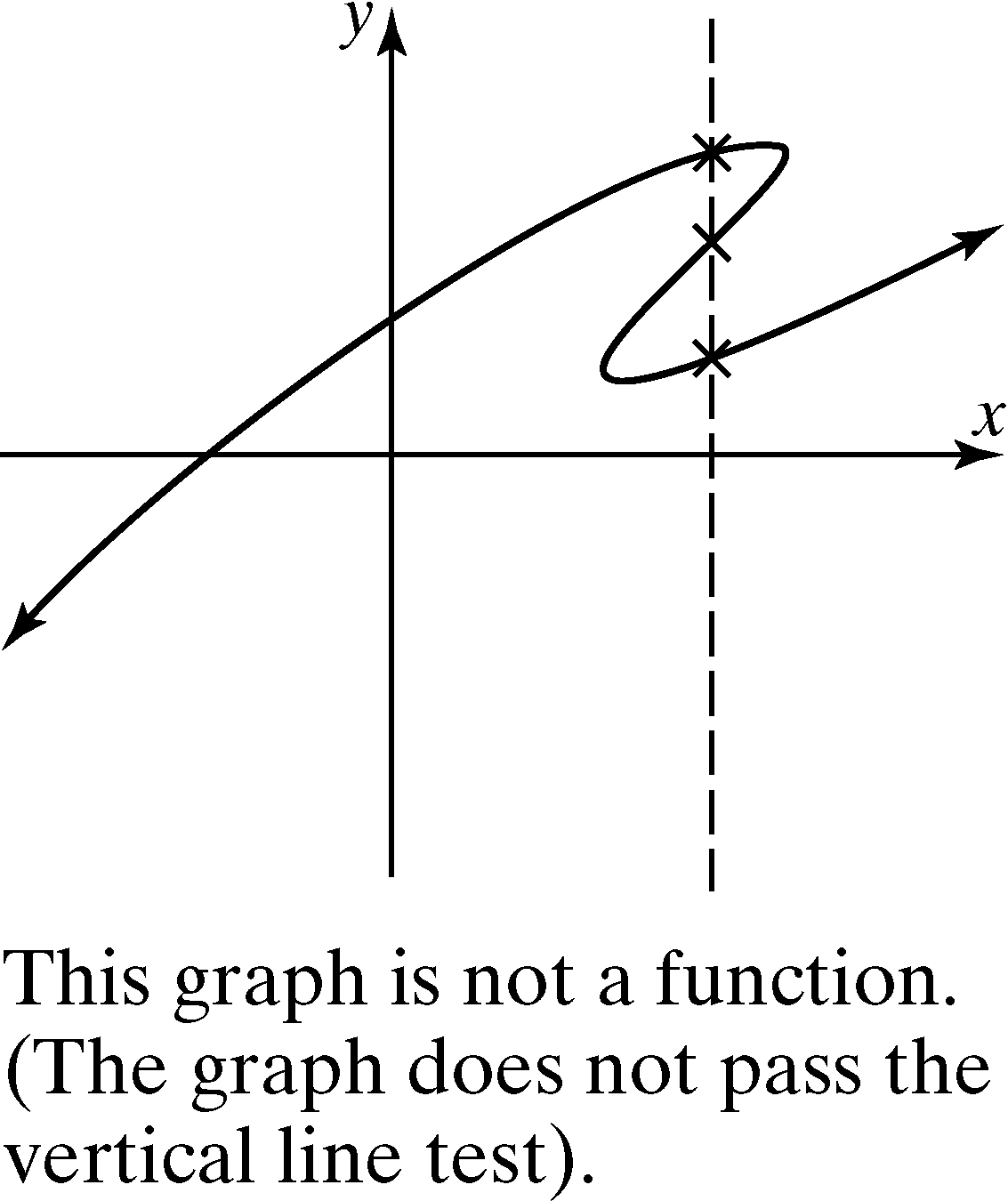
Relations and functions can be described by a graph of their ordered pairs.

c. Is the graph shown the graph of a function?



# Objective 3: Using the Vertical Line Test

When an -coordinate is paired with more than one -coordinate, a vertical line can be drawn that will intersect the graph at more than one point. We can use this fact to determine whether a relation is also a function. We call this the **vertical line test**.

**Vertical Line Test:**

If a vertical line can be drawn so that it intersects a graph more than once, the graph is not the graph of a function.

Recall that the graph of a linear equation is a line, and a line that is not vertical will pass the vertical line test. Thus, all linear equations are functions except those of the form , which are vertical lines.

Determine whether the equation describes a function.

|  |  |
| --- | --- |
| a. | b. |

# Objective 4: Using Function Notation

Consider the linear equation . This linear equation describes a function because every -coodinate is paired with one -coordinate. The variable is a function of the variable . We say the variable is the **independent variable** because any value in the domain can be assigned to . The variable is the **dependent variable** because its value depends on .

The symbol means function of and is read “ of .” This notation is called **function notation**. The equation can be written as using function notation. These equations have the same meaning. In other words,

The notation means replace with and find the resulting or function value.

Since , we know the ordered pair is a point on the graph of the linear function .

Consider the function . Find:

|  |  |  |
| --- | --- | --- |
| a. | b. | c. |