

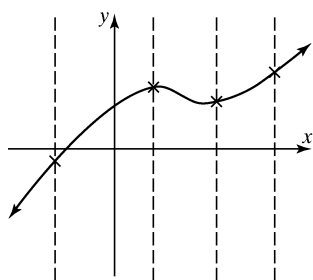
Coreq Support for Section 3.3

Topic 1: Using the Vertical Line Test (Video: Functions 6:43 – 11:35)

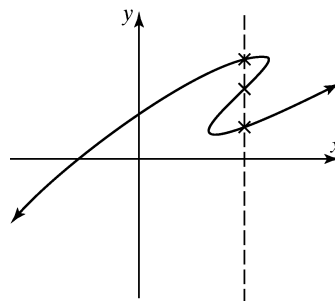
When an x -coordinate is paired with more than one y -coordinate, a vertical line can be drawn that will intersect the graph at more than one point. We can use this fact to determine whether a relation is also a function. We call this the **vertical line test**.

The Vertical Line Test

A graph in the Cartesian plane is the graph of a function if and only if no vertical line intersects the graph more than once.



This graph is a function.
(No vertical line intersects the graph more than once).



This graph is not a function.
(The graph does not pass the vertical line test).

Topic 2: Using Function Notation (Video: Functions 13:45 – 20:38)

Consider the linear equation $y = 2x + 1$. This linear equation describes a function because every x -coordinate is paired with exactly one y -coordinate. The variable y is a function of the variable x . We say the variable x is the **independent variable** because any value in the domain can be assigned to x . The variable y is the **dependent variable** because its value depends on x .

The symbol $f(x)$ means function of x and is read “ f of x .” This notation is called **function notation**. The equation $y = 2x + 1$ can be written as $f(x) = 2x + 1$ using function notation. These equations have the same meaning. In other words, $y = f(x)$.

The notation $f(1)$ means replace x with 1 and find the resulting y or function value.

$$\begin{aligned}f(x) &= 2x + 1 \\f(1) &= 2(1) + 1 = 3\end{aligned}$$

Since $f(1) = 3$, we know the ordered pair $(1, 3)$ is a point on the graph of the linear function $f(x) = 2x + 1$.

Topic 3: Determining the Domain and Range of a Function from its Graph

Topic 4: Sketching the Graphs of Linear Functions

A **linear function** has the form $f(x) = mx + b$ where m is the slope of the line and b is the y -intercept.

The **constant function** is defined by the equation $f(x) = b$, the graph of which is a horizontal line.

The **identity function** defined by $f(x) = x$ is another linear function with $m = 1$ and $b = 0$.