Functions Versus Relations

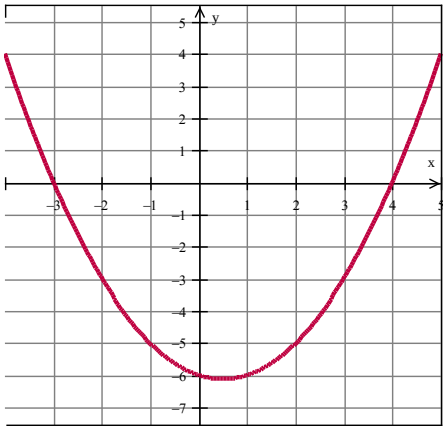
A **relation** is a set of ordered components (often ordered pairs).

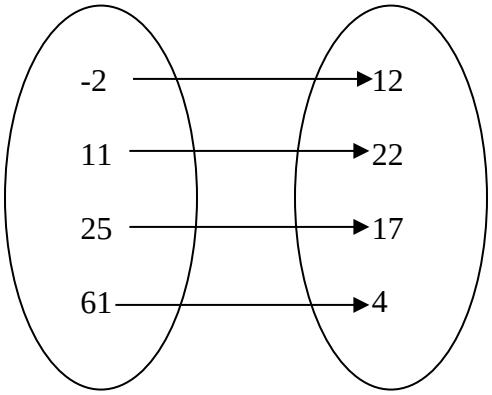
Relations can be expressed as:

$$B=\left\{(4,-2),(3,11),\left(\pi,\frac{3}{4}\right)\right\}$$

x	y
0	1
1	4
2	7

$$y=2x^2-1$$





A **function** is relation in which no two ordered pairs have the same first component. (ie. A function is a relation such that to each value of the independent variable there corresponds only one value of the dependent variable.)

A function is a special type of relation. All functions are relations, but not all relations are functions.

Domain is the set of all possible values of the independent variable (all x-values)
Range is the set of all possible values of the dependent variable (all y-values)

1. Determine if the following relations are functions.
State the domain and range for (a) – (d)

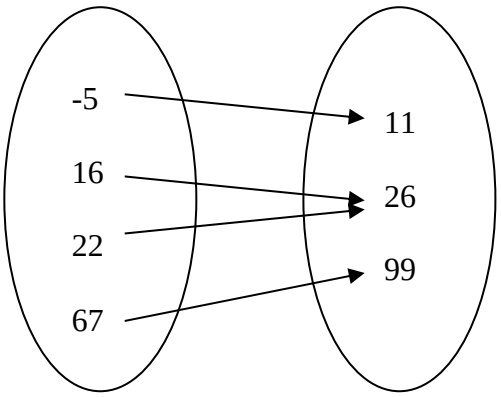
a) $B=\{(1,3),(4,5),(6,7),(9,11)\}$

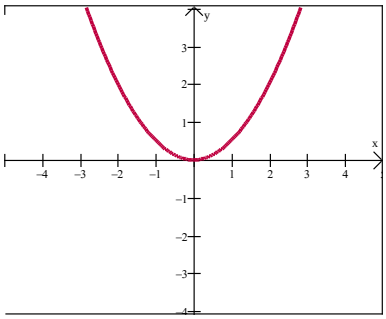
D:{1, 3, 4, 6, 9} R:{

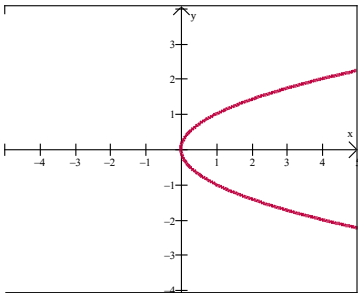
$Q=\{(-7,3),(14,-5),(-7,7),(89,11),(1,4)\}$

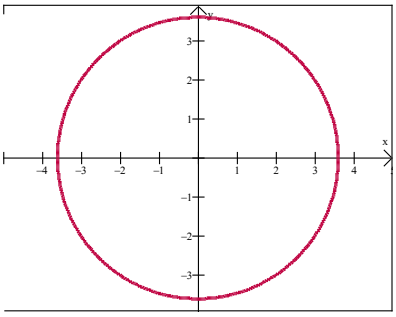
$R=\{(-7,3),(14,3),(7,3),(89,3),(1,3)\}$

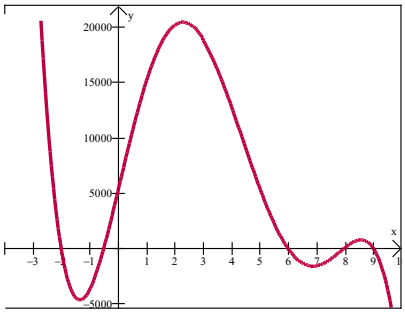
b)

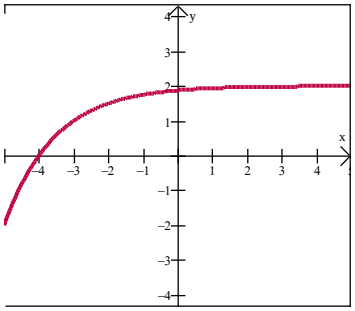


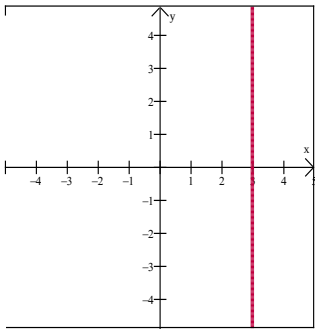
c) 

d) 

e) 

f) 

g) 

h) 

The Vertical Line Test

If a vertical line can be drawn between any 2 points on a graph, the graph is not a function.

2. Identify whether the given equations are functions or relations. HINT: You may draw a graph and use the vertical line test.

a) $y = 3x + 5$

b) $x^2 + y^2 = 16$

c) $y = 2x^2 + 4x - 3$

d) $y = 3$

e) $x = 8$

FUNCTION NOTATION: Revisited

1. The equation $y = x^2 + 5x - 4$ can also be written using function notation as $f(x) = x^2 + 5x - 4$.

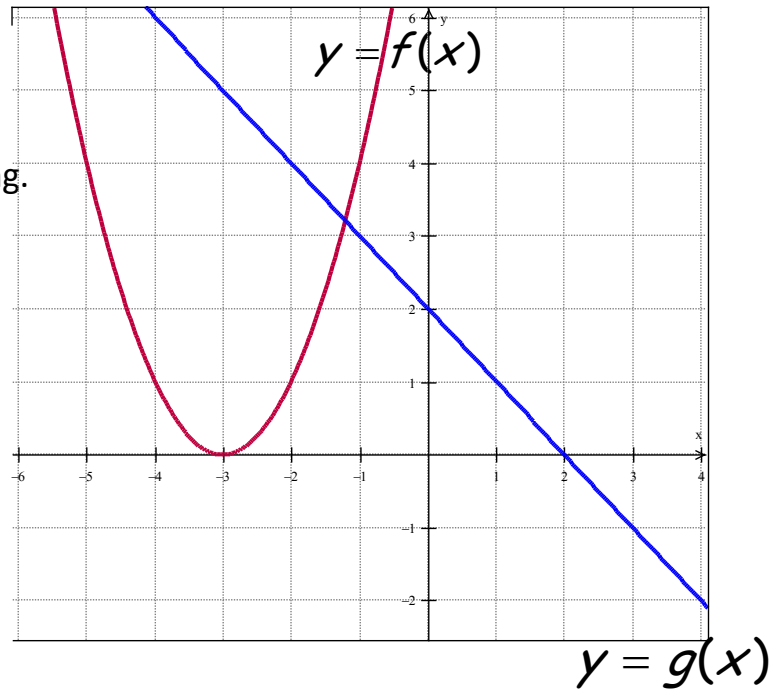
Evaluate the following:

a. $f(-3)$ b. $f\left(\frac{1}{2}\right)$ c. x, when $f(x) = 10$ d. $f(a+1)$

2. Now consider $g(x) = 3x - 2$ as well as $f(x) = x^2 + 5x - 4$.

a. Evaluate $f(2) - g(3)$. b. Simplify: $2f(x) - g(-x)$

3. Consider the following graphs of $y = f(x)$ and $y = g(x)$.



Use the graphs to evaluate the following.

a. $f(-3)$ b. $f(-2)$

c. $f(-4)$ d. $g(0)$

e. $g(1)$ f. $g(2) + f(-4)$

g. What is x when $f(x) = 4$?