U2D2_T Functions-vs-relations and Function Notation MCR 3UI

Friday, February 22, 2019 1:11 PM

U2D2_T Functions...

U2D2 MCR 3UI **Functions Versus Relations**

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

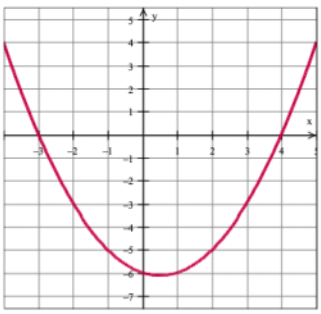
Relations can be expressed as:

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

2.

x	y
0	1
1	4
2	7

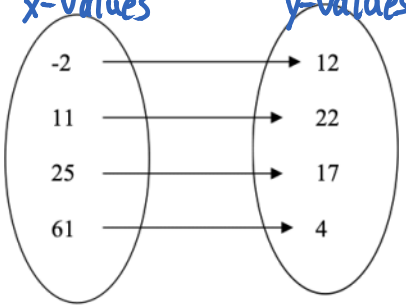
table of values

3. 

graph

4. $y = 2x^2 - 1$ equation

5. x-values y-values



a mapping

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
(Yes – it is a function, No – it is not a function). State the domain and range for (a) – (d), (h)

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

D:{1, 4, 6, 9} R:{ 3, 5, 7, 11}

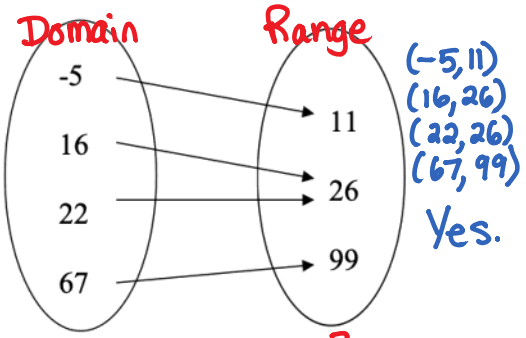
$Q = \{(-7,3),(14,-5),(-7,7),(89,11),(1,4)\}$ No

D:{ -7, 1, 14, 89} R:{ -5, 3, 4, 7, 11}

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

D:{ -7, 1, 7, 14, 89} R:{ 3}

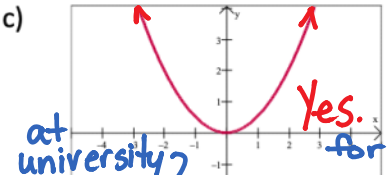
b)



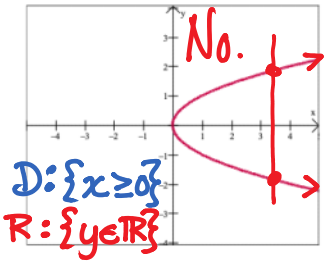
(-5, 11)
(16, 26)
(22, 26)
(67, 99)
Yes.

D : {-5, 16, 22, 67}
R : {11, 26, 99}

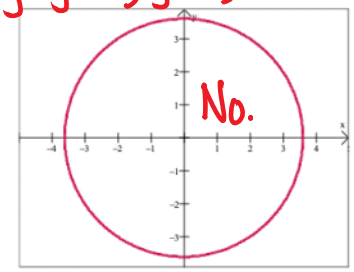
c)



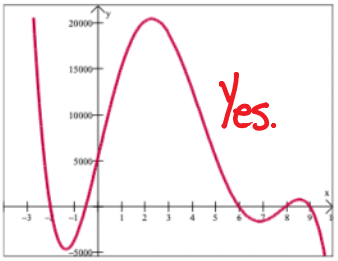
d)



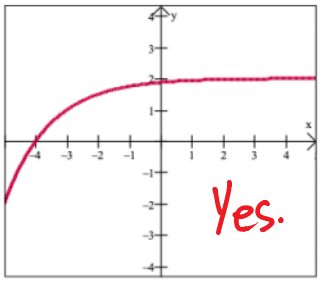
e)



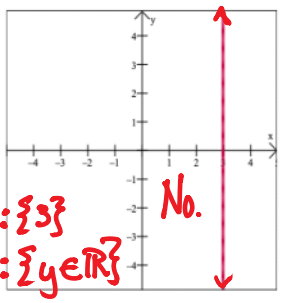
f)



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) $y = 3x + 5$ function (sloped line)

b) $x^2 + y^2 = 16$ not a function (relation) (circle)

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

d) $y = 3$ function (horizontal line)

e) $x = 8$ relation (vertical line)

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. $f(-3) = (-3)^2 + 5(-3) - 4$
$= 9 - 15 - 4$
$= -10$

b. $f\left(\frac{1}{2}\right) = \left(\frac{1}{2}\right)^2 + 5\left(\frac{1}{2}\right) - 4$
$= \frac{1}{4} + \frac{5}{2} - \frac{4}{1}$
$= \frac{1 + 10 - 16}{4}$
$= \frac{-5}{4}$

c. x, when $f(x) = 10$ (y)

Solve for x when $y = 10$
$x^2 + 5x - 4 = 10$
$x^2 + 5x - 14 = 0$
$(x + 7)(x - 2) = 0$
$x = -7$ or $x = 2$

d. $f(a + 1)$
$= (a+1)^2 + 5(a+1) - 4$
$= a^2 + 2a + 1 + 5a + 5 - 4$
$= a^2 + 7a + 2$

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

a. Evaluate $f(2) - g(3)$.

$= (2)^2 + 5(2) - 4 - [3(3) - 2]$

$= 4 + 10 - 4 - (7)$

$= 3$

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

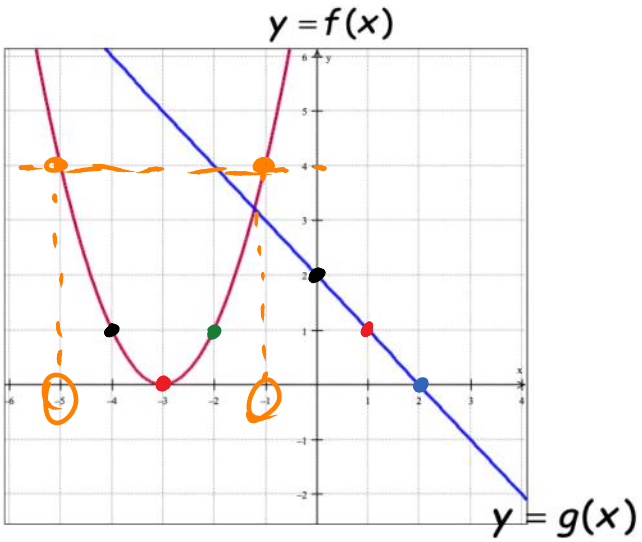
$= 2[x^2 + 5x - 4] - [3(-x) - 2]$

$= 2x^2 + 10x - 8 - (-3x - 2)$

$= 2x^2 + 10x - 8 + 3x + 2$

$= 2x^2 + 13x - 6$

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



Use the graphs to evaluate the following.

a. $f(-3) = 0$

b. $f(-2) = 1$

c. $f(-4) = 1$

d. $g(0) = 2$

e. $g(1) = 1$

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

$= 0 + 1$

$= 1$

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

$x = -5$ OR $x = -1$