

Functions versus Relations

A function is a relation in which each element of the domain maps to exactly one element of the range.

$\{(7, 1), (3, 2), (8, 9)\}$

\* Each x-value has exactly one y-value.

x-values Domain:  $\{7, 3, 8\}$   
 y-values Range:  $\{1, 2, 9\}$

Example 1:  $\{(-6, 7), (8, 14), (3, 2), (1, -4)\}$

Domain =  $\{-6, 8, 3, 1\}$

Range =  $\{7, 14, 2, -4\}$

Is this a function? Yes

Example 2:  $\{(4, -11), (3, 1), (0, 1), (2, 6), (3, -1)\}$

Domain =  $\{4, 3, 0, 2\}$

Range =  $\{-11, 1, 6, -1\}$

Is this a function? No

\* Vertical Line Test

What about from a graph?

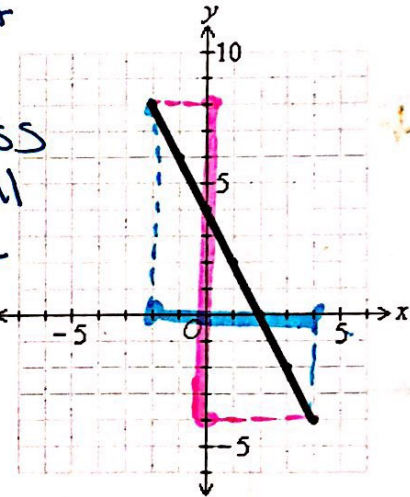
Example 1:

Domain =  $[-2, 4]$

Range =  $[-4, 8]$

Is this a function? Yes

When you run your pencil across the graph, it will only cross the graph 1 time.

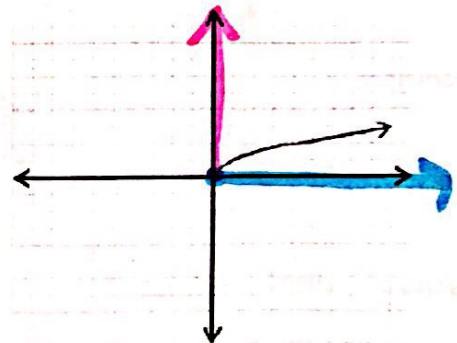


Example 2:

Domain =  $[0, +\infty)$

Range =  $[0, +\infty)$

Is this a function? Yes



Determine if the relation is a function.

1.  $\{(3,4), (4, -6), (5, -7), (3, 2), (-2, 5)\}$

2.  $\{(-4, 6), (-3, 2), (1, 0), (7, 6), (8, 2)\}$

1.  $\{(3,4), (4,-6), (5,-7), (3,2), (-2,5)\}$

Domain =  $\{3,4,5,-2\}$

Range =  $\{4,-6,-7,2,5\}$

Is this a function? No

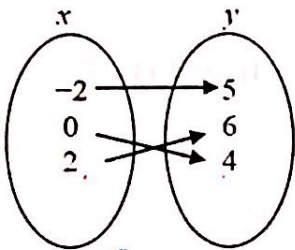
2)  $\{(-4,6), (-3,2), (1,0), (7,6), (8,2)\}$

Domain =  $\{-4,-3,1,7,8\}$

Range =  $\{6,2,0,2\}$

Is this a function? Yes

3.

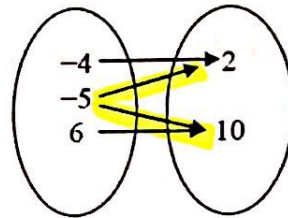


Domain =  $\{-2, 0, 2\}$

Range =  $\{5, 6, 4\}$

Is this a function? Yes

4.

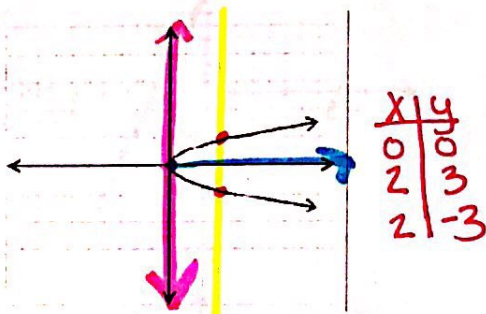


Domain =  $\{-4, -5, 6\}$

Range =  $\{2, 10\}$

Is this a function? No

5.

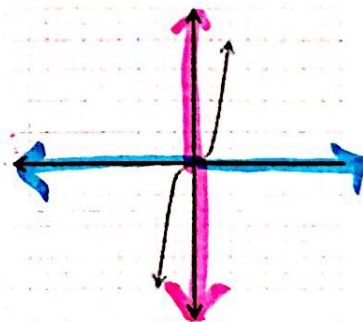


Domain =  $[0, +\infty)$

Range =  $(-\infty, +\infty)$

Is this a function? No

6.



Domain =  $(-\infty, +\infty)$

Range =  $(-\infty, +\infty)$

Is this a function? Yes