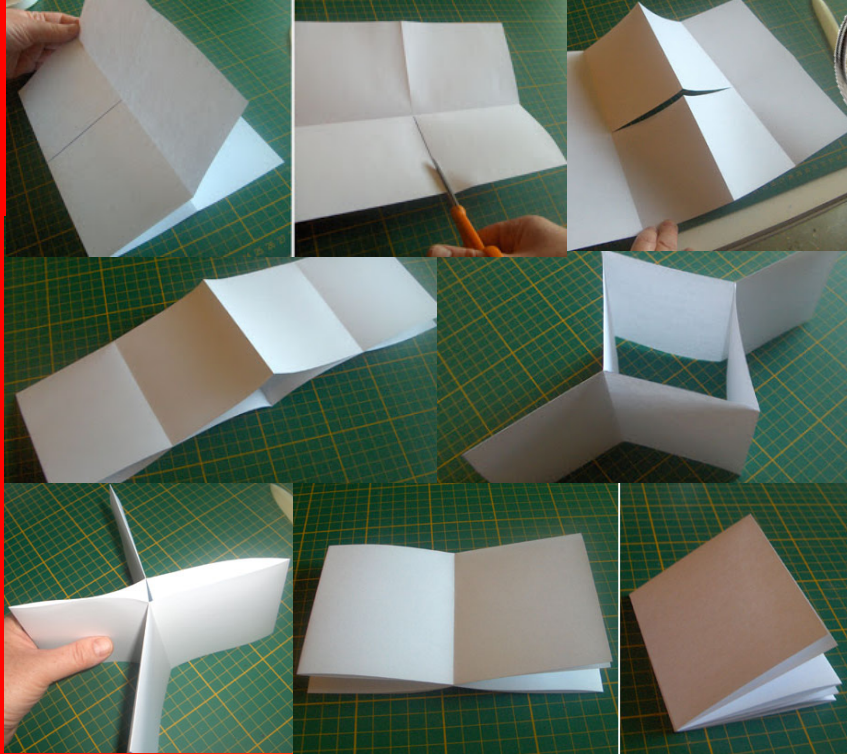




Domain & Range

DOMAIN: the set of all possible values for x , the input variable of a relation

RANGE: the set of all possible values for y , the output variable of a relation

DISCRETE: a set of ordered pairs that graphs a scatter plot

COUNTINUOUS: a line or curve without breaks, gaps, or holes

BOUNDED: a set between two endpoints that are real numbers

UNBOUNDED: a set with no endpoints; it extends to infinity in both directions

HALF-BOUNDED: a set with one endpoint that is a real number and the other end extends to infinity

Example 1 Discrete Relations

Give the domain and range as sets of numbers in order from least to greatest, with no repeats. Recall that the elements of a set are grouped inside braces with commas between. Then decide if each relation is a function.

[A] $\{(2,1), (3,-1), (0,1), (1,-1)\}$

Domain: $\{0, 1, 2, 3\}$

Range: $\{-1, 1\}$

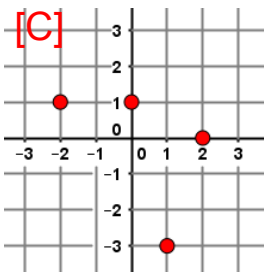
Function? *yes*

[B] $\{(2,1), (3,2), (0,3), (2,-1)\}$

Domain: $\{0, 2, 3\}$

Range: $\{-1, 1, 2, 3\}$

Function? *no*



Domain:

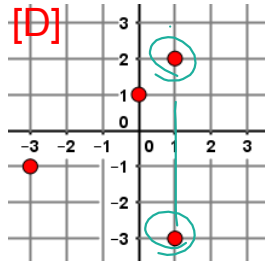
$\{-2, 0, 1, 2\}$

Range:

$\{-3, 0, 1\}$

Function?

yes



Domain:

$\{-3, 0, 1\}$

Range:

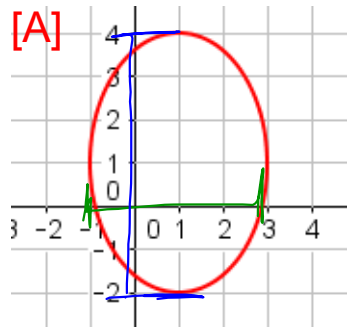
$\{-3, -1, 1, 2\}$

Function?

no

Example 2 Continuous, Bounded Relations

Use an "and" compound inequality to give the domain and range of each relation.
Then decide if the relation is a function.



Domain:

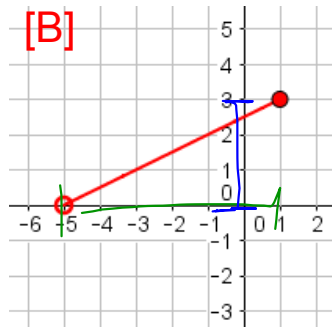
$$-1 \leq x \leq 3$$

Range:

$$-2 \leq y \leq 4$$

Function?

no



Domain:

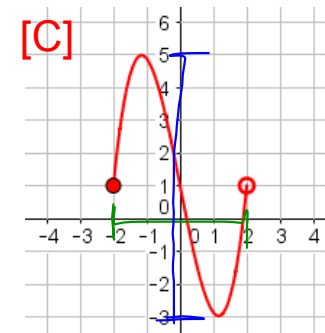
$$-5 < x \leq 1$$

Range:

$$0 < y \leq 3$$

Function?

yes



Domain:

$$-2 \leq x < 2$$

Range:

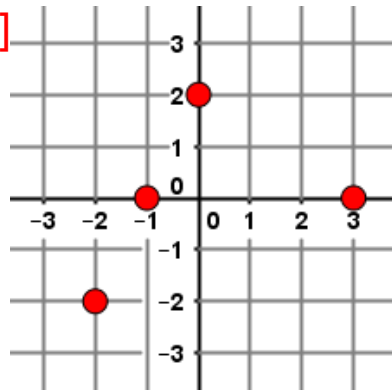
$$-3 \leq y \leq 5$$

Function?

yes

On your whiteboard...

[A]

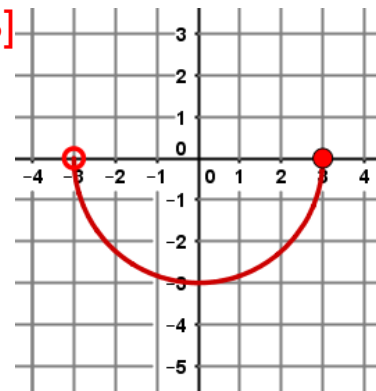


Domain: $\{-2, -1, 0, 3\}$

Range: $\{-2, 0, 2\}$

Function? **yes**

[B]



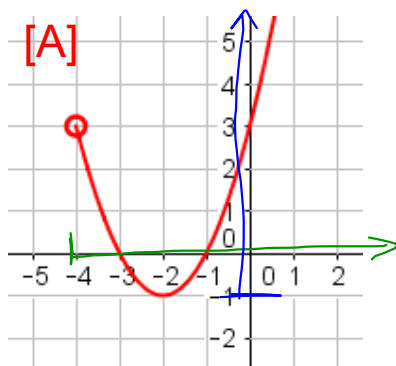
Domain: $-3 < x \leq 3$

Range: $-3 \leq y \leq 0$

Function? **yes**

Example 3 Continuous, Half-Bounded Relations

Use either a $\geq$ or $\leq$ inequality to restrict the domain/range if not "all real numbers" $\mathbb{R}$
Assume each graph extends to infinity unless an open/closed circle is shown for an endpoint.



Domain:

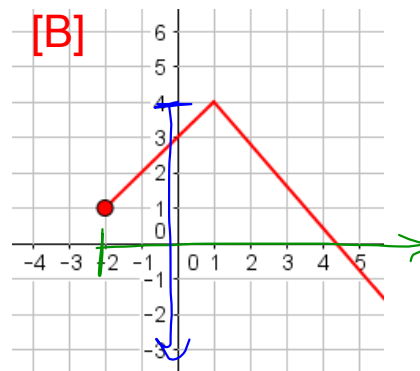
$$x > -4$$

Range:

$$y \geq -1$$

Function?

yes



Domain:

$$x \geq -2$$

Range:

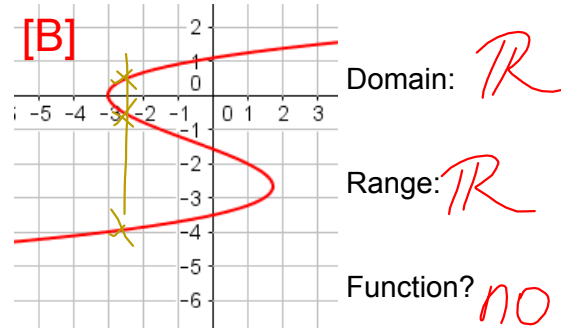
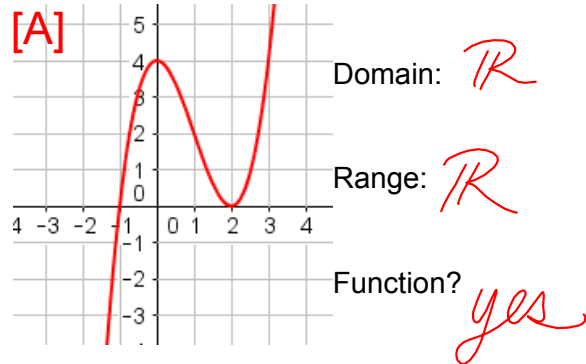
$$y \leq 4$$

Function?

yes

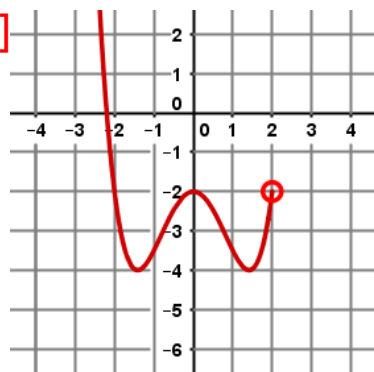
Example 4 Continuous, Unbounded Relations

Use the notation $\mathbb{R}$ for "all real numbers".



On your whiteboard...

[A]

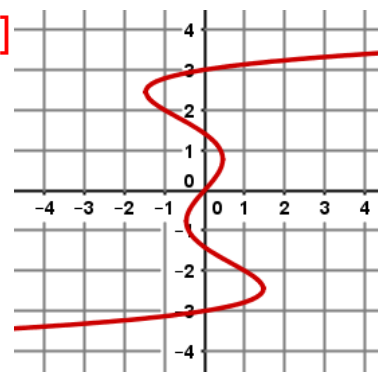


Domain: $x < 2$

Range: $y \geq -4$

Function? **yes**

[B]



Domain: $\mathbb{R}$

Range: $\mathbb{R}$

Function? **no**