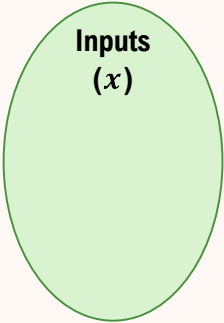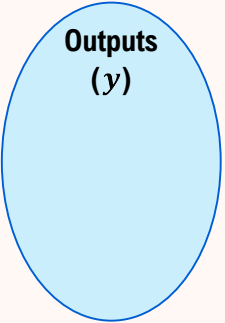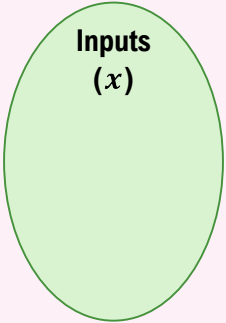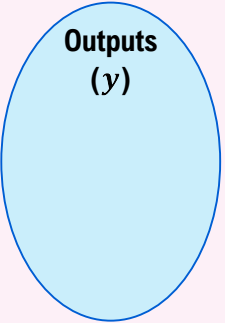## TOPIC: INTRO TO RELATIONS AND FUNCTIONS

### Intro to Relations and Functions

◆ A **relation** is a connection between **inputs** ($x$) & **outputs** ($y$) often represented as a set of ordered pairs ($x$,$y$).

  ▶ A **function** is a relation where each input ($x$) is paired with at most ___ output ($y$).

| EXAMPLE | For each relation, list the inputs & outputs and draw arrows showing how the values correspond. |

| Relations | |
|---|---|
| | **Functions** |
| {(−2,2), (1,1), (3,−2), (1,4)} | {(−4,2), (−2,−1), (1,2), (3,4)} |
| **Inputs** **Outputs** ($x$) ($y$) | **Inputs** **Outputs** ($x$) ($y$) |

◆ Relations can be represented as a set of ordered pairs, a correspondence, table, graph, or equation.

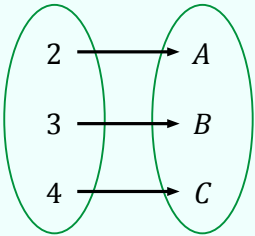| EXAMPLE | Determine if each relation is a function. |

($A$)

| $x$ | $y$ |
|---|---|
| $\dfrac{1}{2}$ | 4 |
| 1 | $\dfrac{3}{2}$ |
| 2 | $\dfrac{3}{2}$ |
| $\dfrac{1}{2}$ | 5 |

[ FUNCTION | NOT A FUNCTION ]

($B$)

2 ⟶ A
3 ⟶ B
4 ⟶ C

[ FUNCTION | NOT A FUNCTION ]

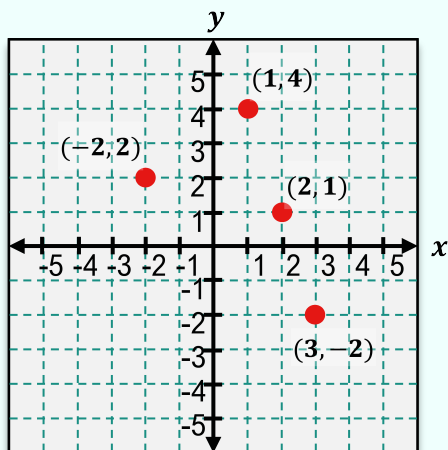## TOPIC: INTRO TO RELATIONS AND FUNCTIONS

## Vertical Line Test

◆ When a relation is represented on a graph, you can determine if it is a function using the **vertical line test**.

▶ If you can draw *any* vertical line that passes through more than 1 point, the graph _____ a function.
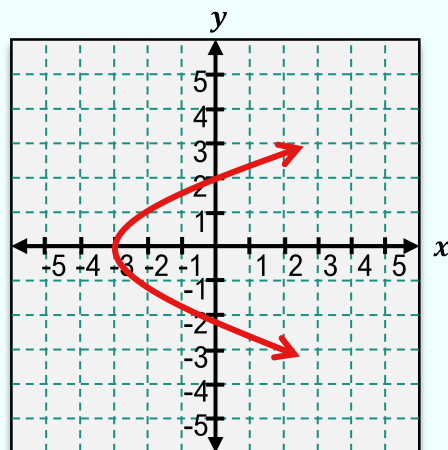
**EXAMPLE**  Use the vertical line test to determine if each graph is a function.
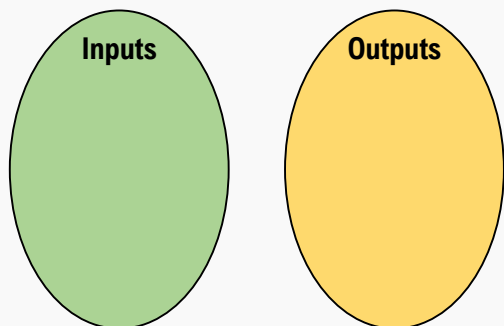
$(A)$



[ FUNCTION | NOT A FUNCTION ]

$(B)$



[ FUNCTION | NOT A FUNCTION ]
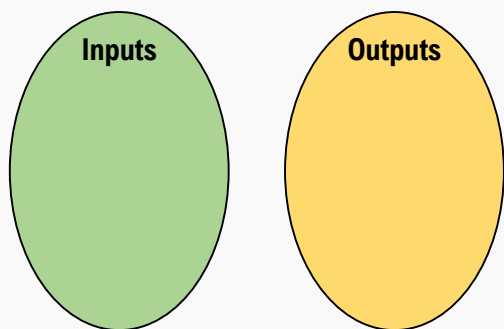
# TOPIC: INTRO TO RELATIONS AND FUNCTIONS

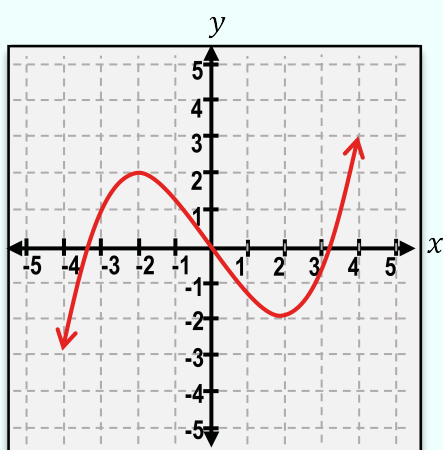State the inputs and outputs of the following relation. Is it a function? $\{(-3, 5), (0, 2), (3, 5)\}$

**Inputs**       **Outputs**

State the inputs and outputs of the following relation. Is it a function? $\{(2, 5), (0, 2), (2, 9)\}$
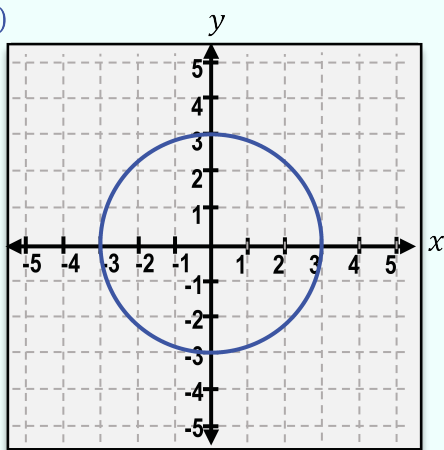
**Inputs**       **Outputs**

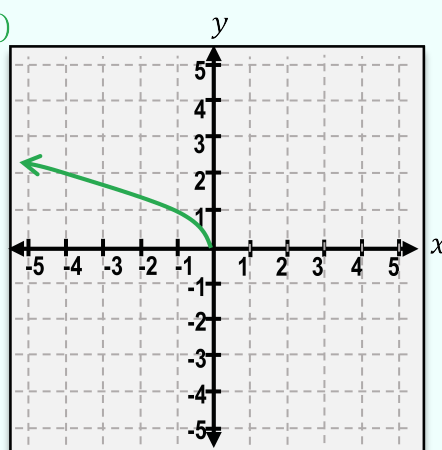Determine below which of the graphs are functions (select all that apply).

(A)

(B)

(C)

## TOPIC: INTRO TO RELATIONS AND FUNCTIONS

### Domain and Range

◆ For a relation or function, the **domain** is the set of inputs ($x$-values) and the **range** is the set of outputs ($y$-values).

**EXAMPLE**  Write a list of ordered pairs for the relation, then find the domain and range.

| New | Domain and Range |
|-----|------------------|

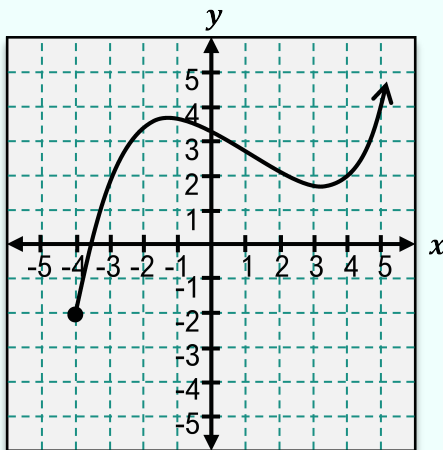| $x$ | $y$ |
|-----|-----|
| – 2 | 2 |
| 1 | 1 |
| 3 | –2 |
| 4 | 4 |

**Domain:**

**Range:**

◆ **Domain** of a _____ graph is the *interval* of all $x$-values, **range** is the *interval* of all $y$-values.

**EXAMPLE**  Find the domain and range of the function. Write using interval notation.

**Recall**
- ● → Include with **[ ]**
- ○ → Exclude with **( )**

*(Interval Notation)*



**Domain:**

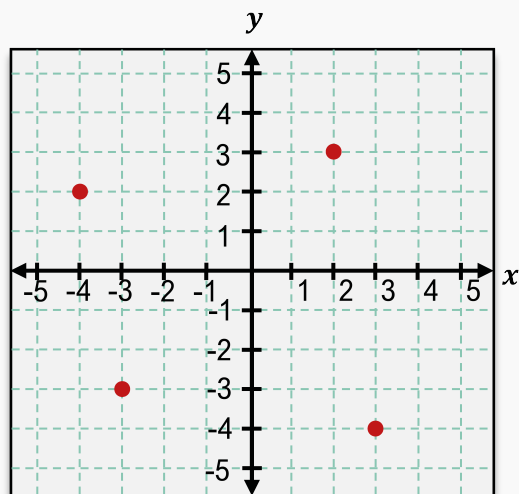**Range:**

# TOPIC: INTRO TO RELATIONS AND FUNCTIONS

Find the domain and range for each relation.

$(A)$

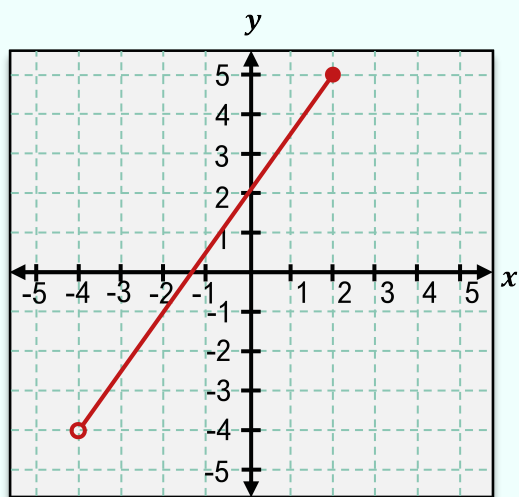$\{(-4, 2), (-3, -5), (3, 4), (5, -2)\}$

$(B)$



**EXAMPLE**   Find the domain and range of the following function given its graph. Write in interval notation.

$(A)$



$(B)$