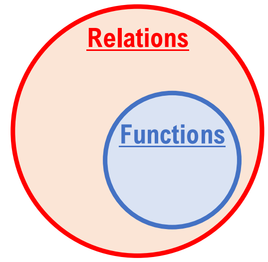
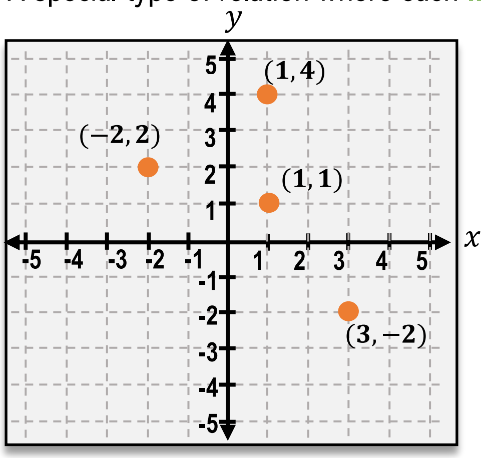
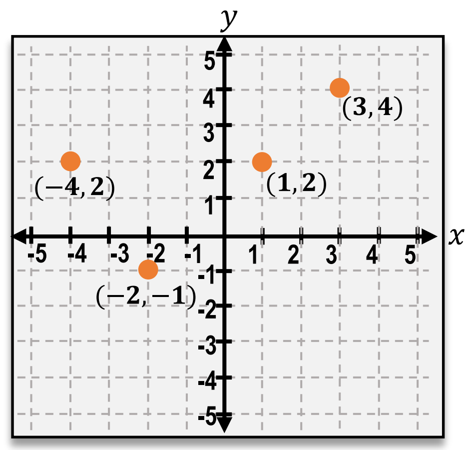


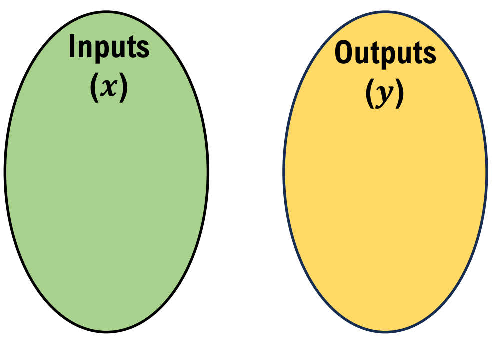
TOPIC: FUNCTIONS

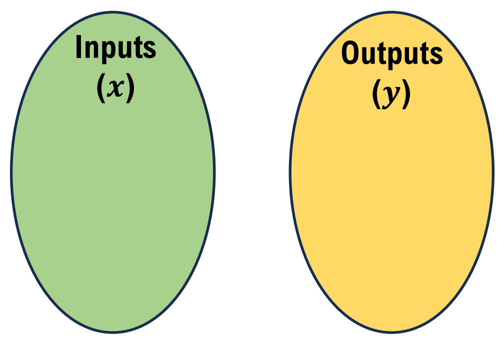
Relations and Functions

- **Relation:** A connection between ______ & ______ values.
  - Graphically, they are represented as __________ pairs (x, y)
- **Function:** A special type of relation where each input has at most ______ output.



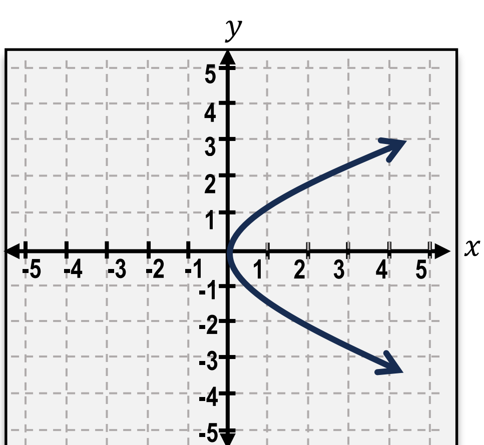


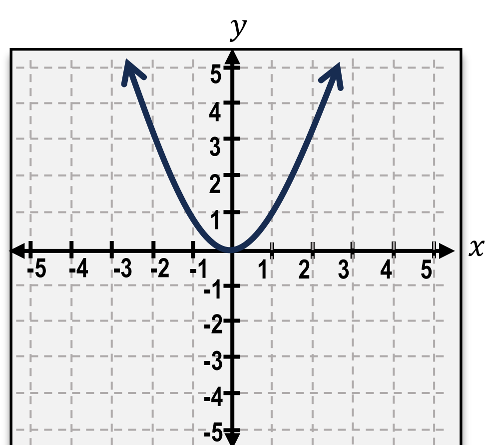




[FUNCTION | NOT A FUNCTION] [FUNCTION | NOT A FUNCTION]

- A way to quickly determine if a graph is a function or not is the **Vertical Line Test:**
  - If you can draw ***any*** vertical line that passes through more than 1 point, the graph ________ a function.

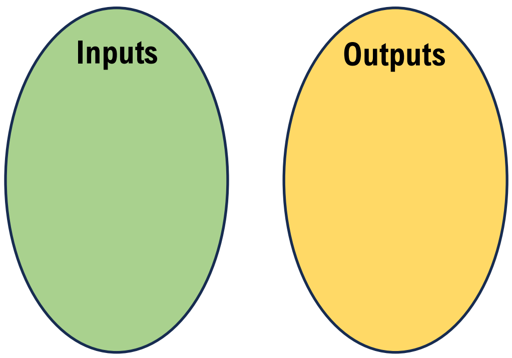




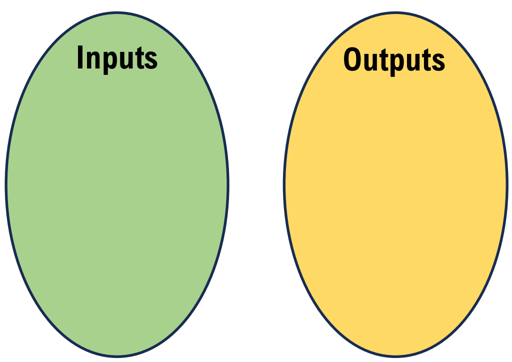
[FUNCTION | NOT A FUNCTION] [FUNCTION | NOT A FUNCTION]

TOPIC: FUNCTIONS

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

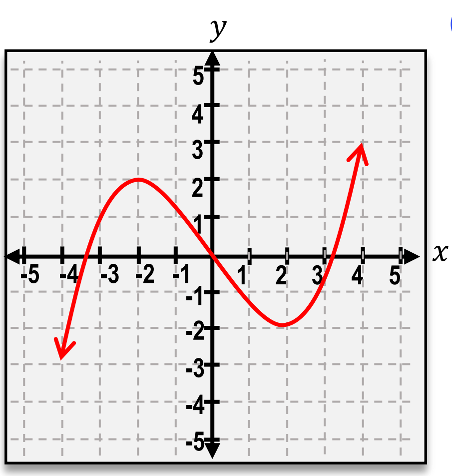


PRACTICE: State the inputs and outputs of the following relation. Is it a function? $\{(2,5),(0,2),(2,9)\}$

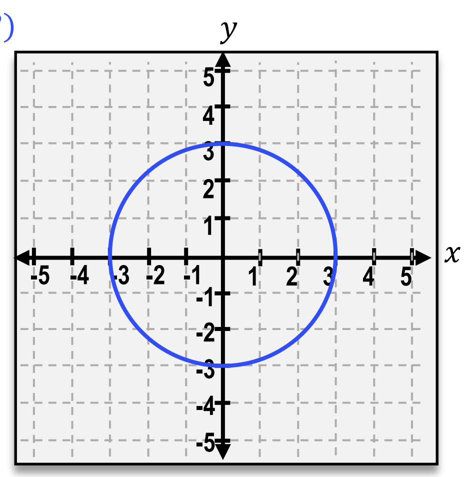


PROBLEM: Determine below which of the graphs are functions (select all that apply).

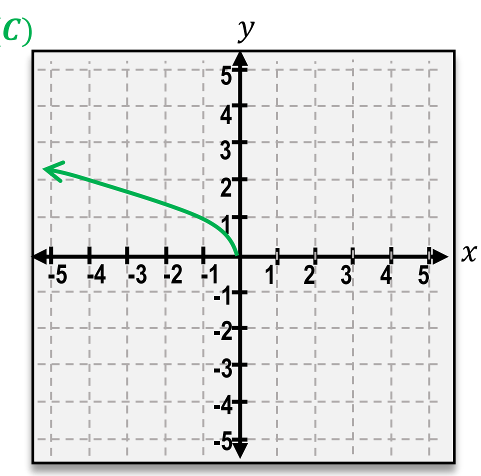
(A)



(B)



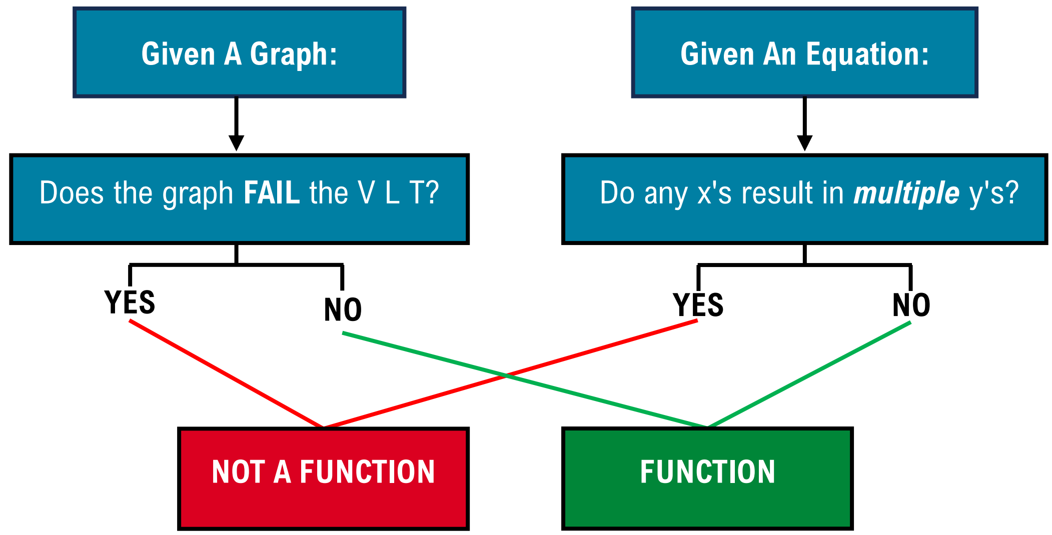
(C)



TOPIC: FUNCTIONS

Verifying if Equations are Functions

- When verifying **equations** as functions, you should _______________ as a first step.



EXAMPLE: Determine if each of the equations below is **a function**, or **not a function**.

(A)

$$y + 4 = 3x$$

x		y
-1		
0		
1		
2		

If equation is a ________, then it is a

[FUNCTION | NOT A FUNCTION].

(B)

$$x^2 + y^2 = 25$$

x		y
-1		
0		
1		
2		

If equation has an ________ power of y, then it is a

[FUNCTION | NOT A FUNCTION].

- If an equation is a function, we can write it using function ___________ (replace ____ with ______).
  - We can write $y = 3x - 4$ as ____ $= 3x - 4$

TOPIC: FUNCTIONS

PRACTICE: Is the equation $y = -2x + 10$ a function? If so, rewrite it in function notation and evaluate at $f(3)$.

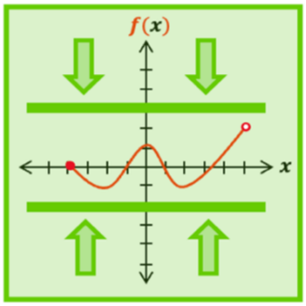
PRACTICE: Is the equation $y^2 + 2x = 10$ a function? If so, rewrite it in function notation and evaluate at $f(-1)$.

TOPIC: FUNCTIONS

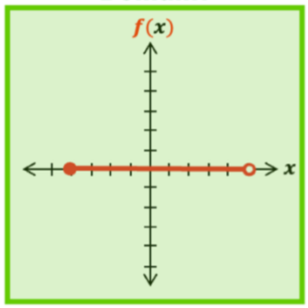
Finding The Domain And Range Of A Graph

- The **domain** of a graph is the allowed ___-values, and the **range** of a graph is the allowed ___-values.
  - To find the **domain** of a graph, "***squish***" to the ___-axis. To find the **range**, "***squish***" to the ___-axis.

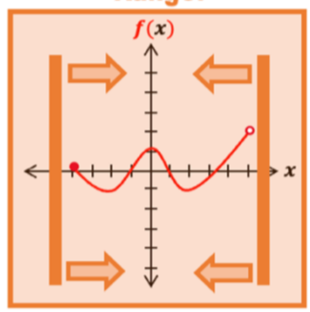
Domain:



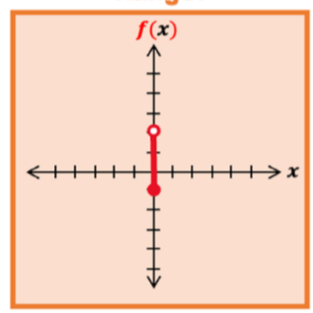
Domain:



Range:



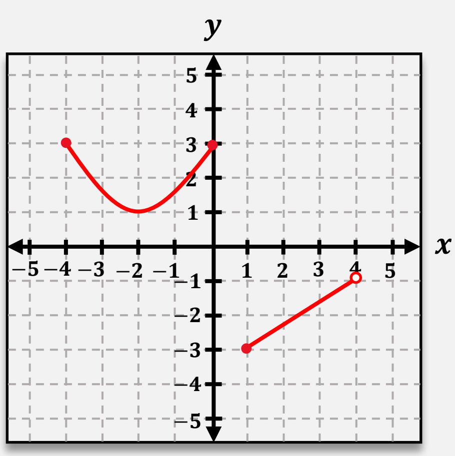
Range:

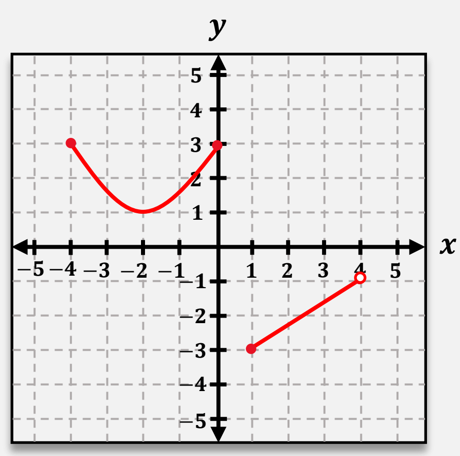


Interval Notation:	**Set Builder Notation:**
$Domain = [-4, 5)$	$Domain = \{x \mid -4 \le x < 5\}$
$Range = [-1, 2)$	$Range = \{y \mid -1 \le x < 2\}$

- The **[,], ≤, ≥** symbols mean we **[INCLUDE | DON'T INCLUDE]** the value.
- The **(,), <, >** symbols mean we **[INCLUDE | DON'T INCLUDE]** the value.

<u>EXAMPLE</u>: Determine the **domain** & **range** of the following graph below. Express the answer using interval notation.

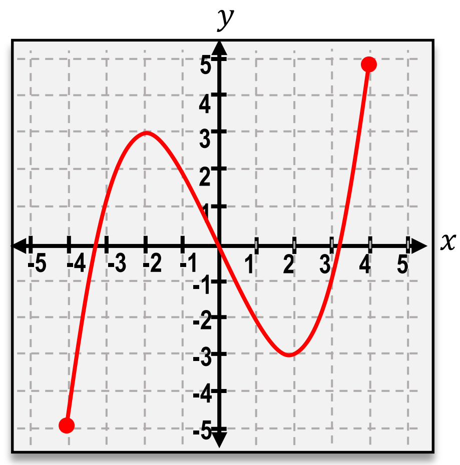




- When we have multiple intervals or "jumps" in the graph, use the union symbol (___).

TOPIC: FUNCTIONS

PRACTICE: Find the domain and range of the following graph (write your answer using interval notation).



TOPIC: FUNCTIONS

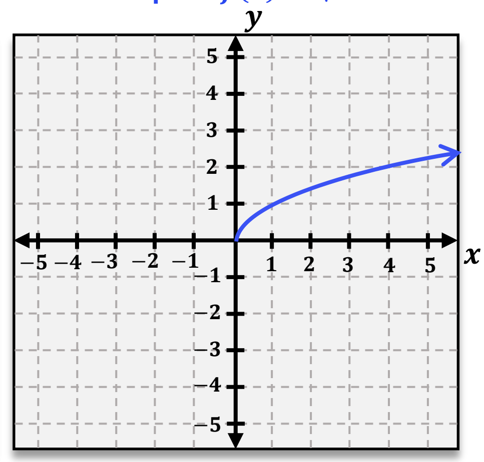
Finding the Domain of an Equation

- You may need to find the **domain** (allowed x-values) of a function when given an equation instead of a graph.
  - First determine ***restrictions*** by identifying values that ________ the function. Two common situations:

1) x inside of a Square Root

Domain: $\boldsymbol{x}$-values that don't make the inside of the square root __________.

Graph of $f(x) = \sqrt{x}$:



EXAMPLE: Find the domain of the function $\boldsymbol{f(x)} = \sqrt{\boldsymbol{x}}$ without graphing. Express using interval notation.

Restriction: $\boldsymbol{x}$-values that make $\sqrt{}$ negative: ______, therefore

Domain:

---

2) x in the Denominator of a Fraction

Domain: $\boldsymbol{x}$-values that don't make the denominator _________.

EXAMPLE: Find the domain of the function $\boldsymbol{f(x)} = \frac{2}{x-5}$ using interval notation.

Restriction: $\boldsymbol{x}$-values that make denominator 0: _______, therefore

Domain:

TOPIC: FUNCTIONS

PRACTICE: Find the domain of $f(x) = \sqrt{x+4}$. Express your answer using interval notation.

PRACTICE: Find the domain of $f(x) = \frac{1}{x^2-5x+6}$. Express your answer using interval notation.