Lesson 1.4 - Using Interval Notation to quantify Domain and Range

Learning Objectives: SWBAT

- Define the domain and range of a function using interval notation

What are **"Intervals"** of a function?

- Intervals are "portions" of the domain of a function (remember, domain = "x" values)
- They have left and right boundaries that include all points on the graph in between
- When the boundary itself is part of the interval, it is represented by a closed circle on the graph
- When the boundary itself is NOT part of the interval, it is represented by an open circle on the graph
- The range of the interval is defined by the least/greatest "y" value

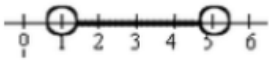
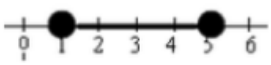
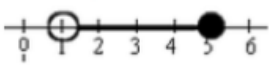
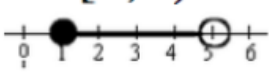
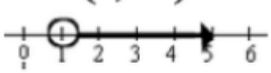
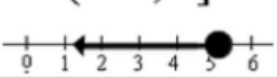
Review of Interval Notation

By interval notation: An **interval** is a connected subset of numbers. **Interval notation** is an alternative to expressing your answer as an inequality. Unless specified otherwise, we will be working with real numbers.

When using interval notation, the symbol:
(means "not included" or "open".
[means "included" or "closed".

$2 \le x < 6$	as an inequality.
$[2,6)$	in interval notation.

The chart below will show you all of the possible ways of utilizing interval notation.

Interval Notation: (description)	(diagram)
Open Interval: (a, b) is interpreted as $a < x < b$ where the endpoints are NOT included. (While this notation resembles an ordered pair, in this context it refers to the interval upon which you are working.)	$(1,5)$ 
Closed Interval: $[a, b]$ is interpreted as $a \le x \le b$ where the endpoints are included.	$[1,5]$ 
Half-Open Interval: $(a, b]$ is interpreted as $a < x \le b$ where a is not included, but b is included.	$(1,5]$ 
Half-Open Interval: $[a, b)$ is interpreted as $a \le x < b$ where a is included, but b is not included.	$[1,5)$ 
Non-ending Interval: (a,∞) is interpreted as $x > a$ where a is not included and infinity is always expressed as being "open" (not included).	$(1,\infty)$ 
Non-ending Interval: $(-\infty, b]$ is interpreted as $x \le b$ where b is included and again, infinity is always expressed as being "open" (not included).	$(-\infty,5]$ 

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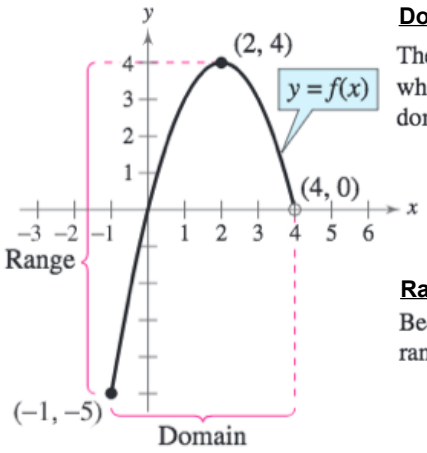
Example: Define the domain and range of the graph below using interval notation:



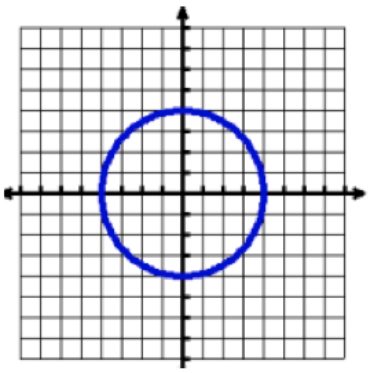
Domain

The closed dot at $(-1, -5)$ indicates that $x = -1$ is in the domain of f, whereas the open dot at $(4, 0)$ indicates that $x = 4$ is not in the domain. So, the domain of f is all x in the interval $[-1, 4)$.

Range

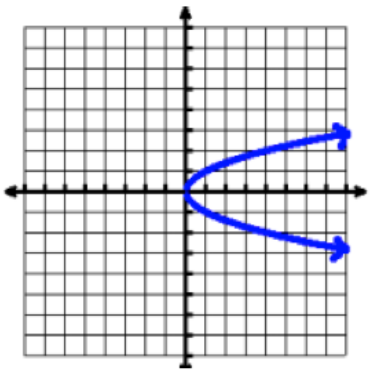
Because the graph does not extend below $f(-1) = -5$ or above $f(2) = 4$, the range of f is the interval $[-5, 4]$.

Your Turn: Define the domain and range of the graphs below using interval notation:



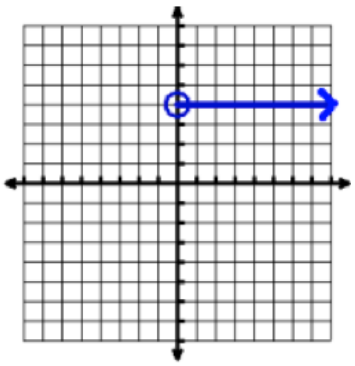
Domain : _____

Range : _____



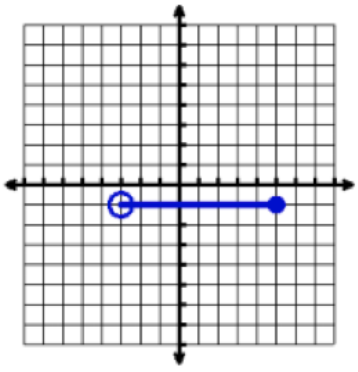
Domain : _____

Range : _____



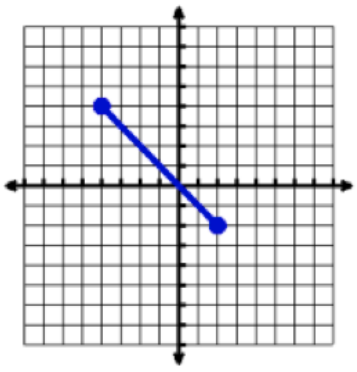
Domain : _____

Range : _____



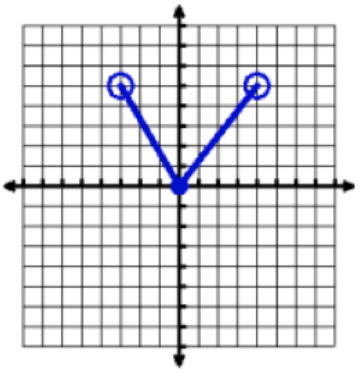
Domain : _____

Range : _____



Domain : _____

Range : _____



Domain : _____

Range : _____

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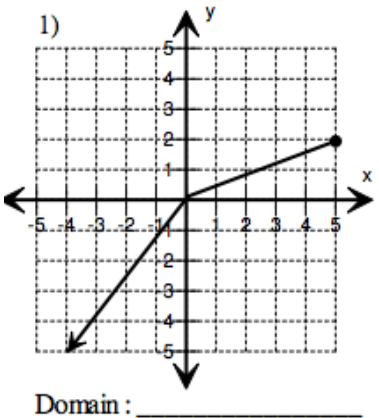
Example

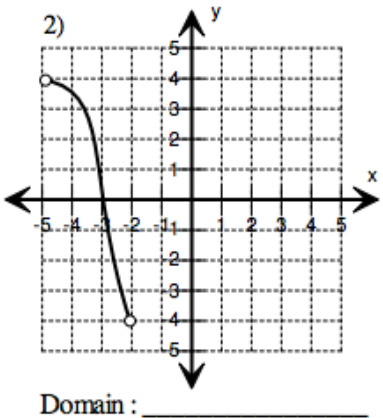
1)



Domain : _____

Range : _____

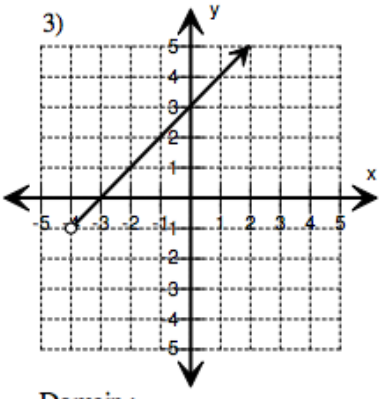
2)



Domain : _____

Range : _____

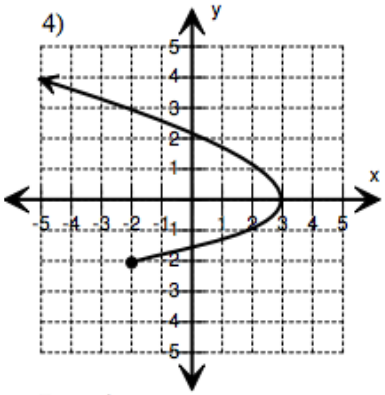
3)



Domain : _____

Range : _____

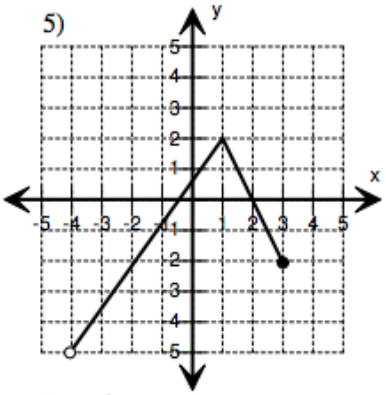
4)



Domain : _____

Range : _____

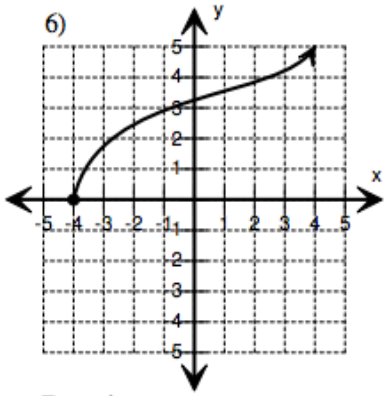
5)



Domain : _____

Range : _____

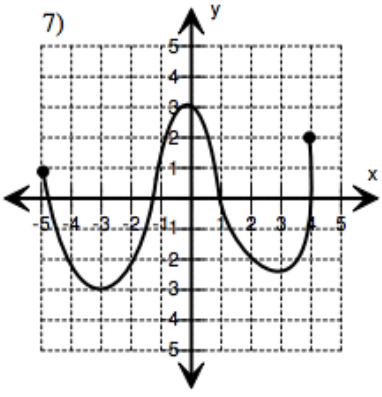
6)



Domain : _____

Range : _____

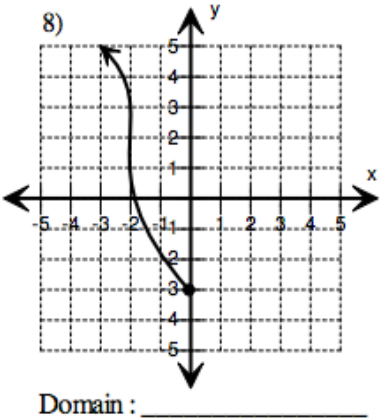
7)



Domain : _____

Range : _____

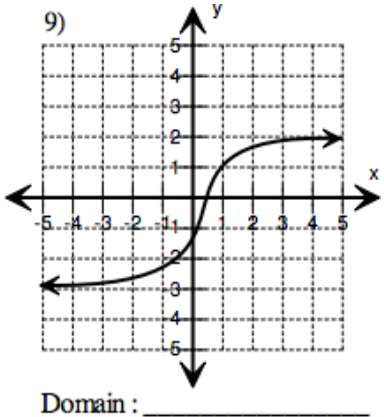
8)



Domain : _____

Range : _____

9)



Domain : _____

Range : _____