Section 1.1.5 Domain and Range

Objective: In this lesson you learned how to identify domain, range, and how to write domain and range in Roster notation, Set-Builder notation, and Interval notation.

Important Vocabulary		
Domain	**Range**	**Roster Notation**
Set-Builder Notation	**Interval Notation**	

What you should learn:

How to find (determine) domain and range from a graph and/or equation

I. Domain and Range

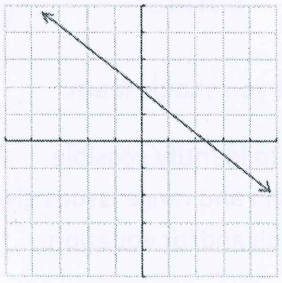
What is domain? ~ input; independent variable

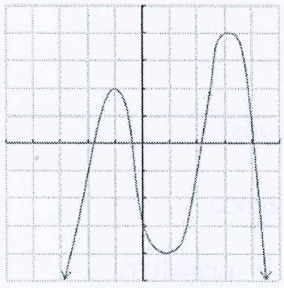
The set of all x-values to which a function assigns a corresponding real y-value.

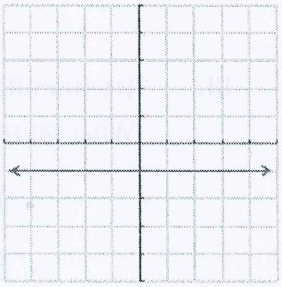
What is range? ~ output; dependent variable

The set of all y-values that result from the x-values

How can you find (determine) domain and range when given a graph?







- Domain: look where the graph begins/ends from left to right
- Range: look where the graph begins/ends from bottom to top

How can you find (determine) domain and range when given an equation?

- Domain: look at the values that can (cannot) be used as input
- Range: look at the resulting output based on your domain

II. Notation

Most Straight forward
Best for small number of data values

What you should learn:

How to write domain and range in different notation formats

A. Roster Notation –

a list of all elements in a set

- List is enclosed with curly braces

{ }

B. Set-Builder Notation –

a description of the included values is given

VARIABLE

can be excluded values too!

- Form => $\{ x \mid \text{description of included values} \}$

"such that"

C. Interval Notation –

a representation of an interval on the real number line

- Form => lower bound, upper bound ← Enclosed with ( ) and/or [ ]

∞ ← Infinity
"without bound"

Excluded Values

Included Values

III. Domain Restrictions

What you should learn:

How to identify possible domain and range issues given a graph and/or equation

What causes domain restrictions?

- Division by zero
- Even roots of negative numbers

Section 1.1.5 Examples – Domain and Range

(1) Determine the domain and range of the following set of ordered pairs.

$$\{(-8,0),(6,4),(0,0),(-7,-3),(10,-5)\}$$

Domain: $\{-8, 6, 0, -7, 10\}$

Range: $\{0, 4, -3, -5\}$ ← NOTICE, ZERO IS ONLY LISTED ONCE; DO NOT NEED TO REPEAT VALUES IN THE SAME SET.

(2) Given the inequality, write its equivalent form in set-builder notation.

$$a > 12$$

$\{a \mid a > 12\}$

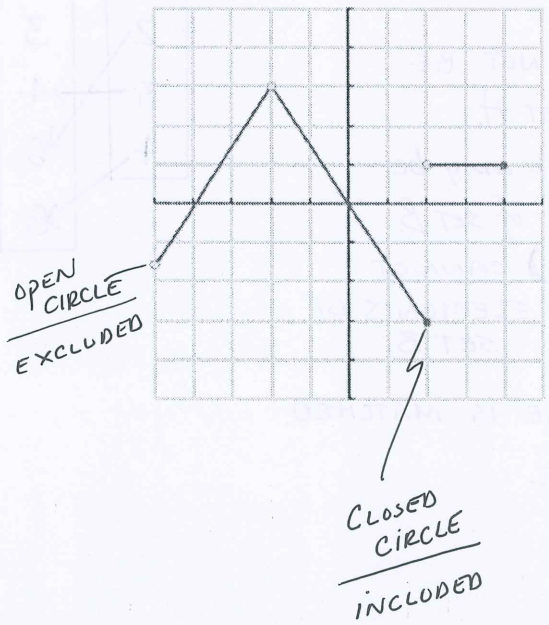
(3) Given the inequality, write its equivalent form in interval notation.

$$x \leq 7$$

$(-\infty, 7]$ ← 7 is included

Infinity is always considered EXCLUDED

(4) Use the graph of the function to write the domain and range in set-builder notation and interval notation.



SET BUILDER NOTATION

Domain: $\{x \mid -5 < x \leq 4, x \neq -2\}$

Range: $\{y \mid -3 \leq y < 3, y \neq -1.5\}$

INTERVAL NOTATION

Domain: $(-5, -2) \cup (-2, 4]$

Range: $[-3, -1.5) \cup (-1.5, 3)$