كلية شط العرب الجامعة
قسم هندسة تقنيات الحاسوب
المرحلة الاولى

Mathematics

Functions and their graphs

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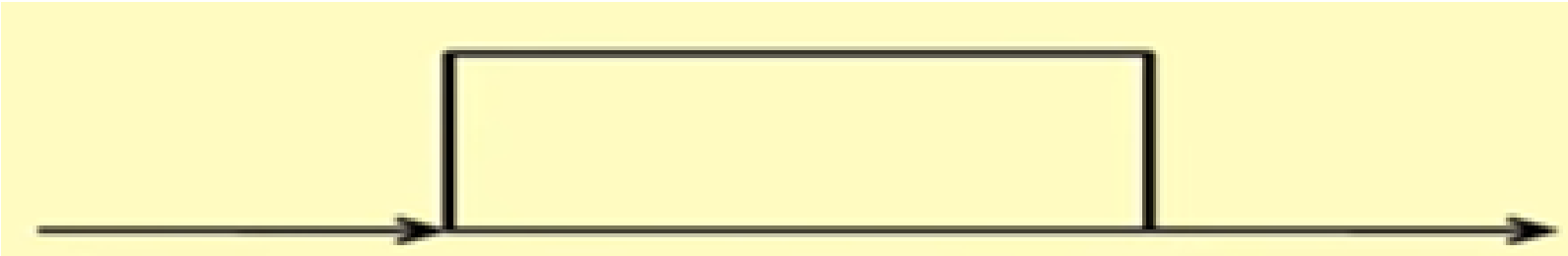
A function is a rule that for every input assigns a specific output. You can also think of a function as a machine in which each input produces one output.

For example , let's say you own a prepaid phone . Your monthly cost is a function of the number of minutes you use . The cost is $0.15 per minute .



The input, usually x, called the independent variable.
The output, usually y, called the dependent variable.

- The set of all possible inputs is called the DOMAIN.

- The DOMAIN is the set of all possible x - values .

- The set of all possible outputs is called the RANGE .

- • The RANGE is the set of all possible y - values .

Determine the domain and range.

Example

Y=4+3x

x	y
0	5
1	7
2	9
3	11
.	
.	
.	

Example

y=5+2x

f(x)=5+2x

- Domain: {0,1,2,3,……}
- Range:{5,7,9,1,….}

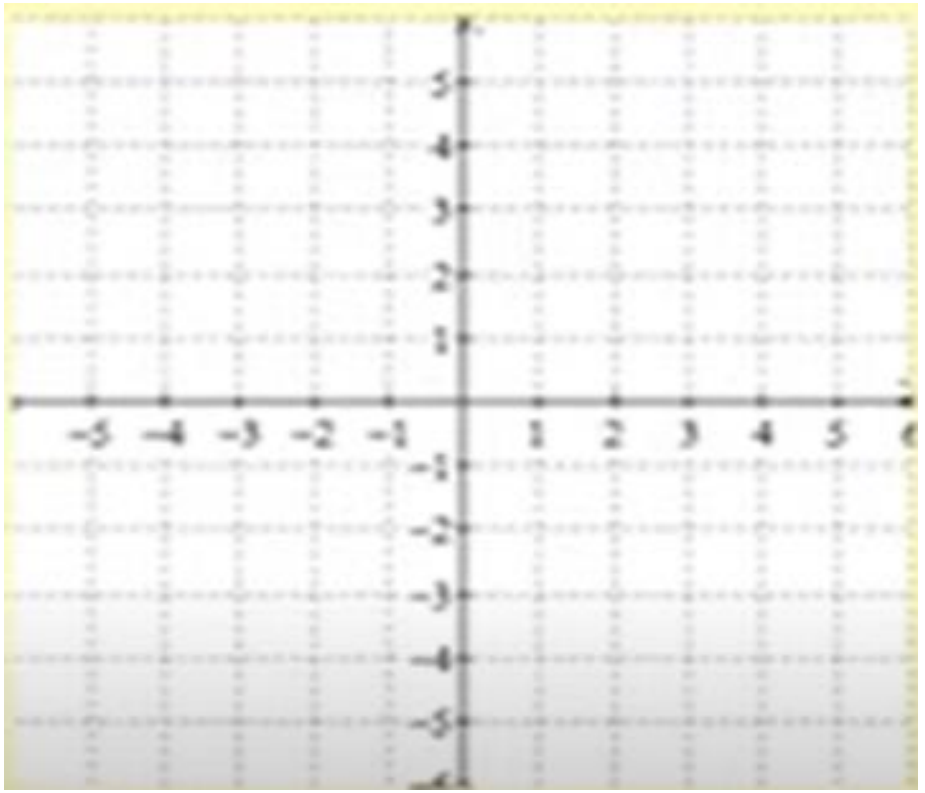
Determining function values and graphing functions.

Example 1:

Determine the domine and range

$f(x)= 4x-2$

x	y

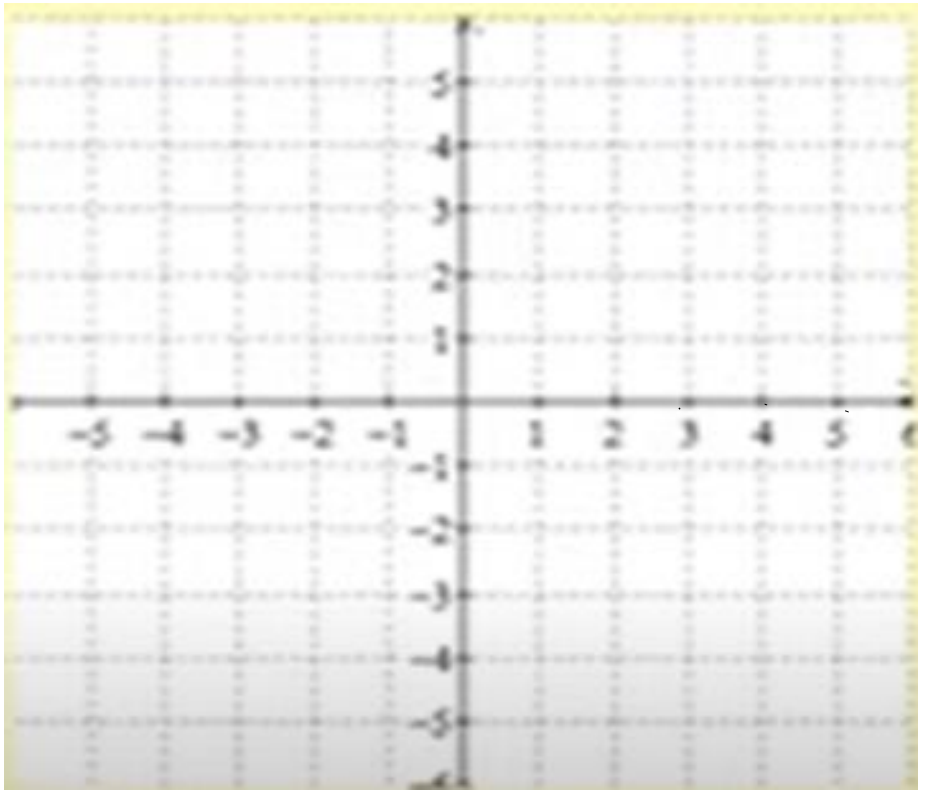


Example 2:

Determine the domine and range

f(x)= x^2

x	y

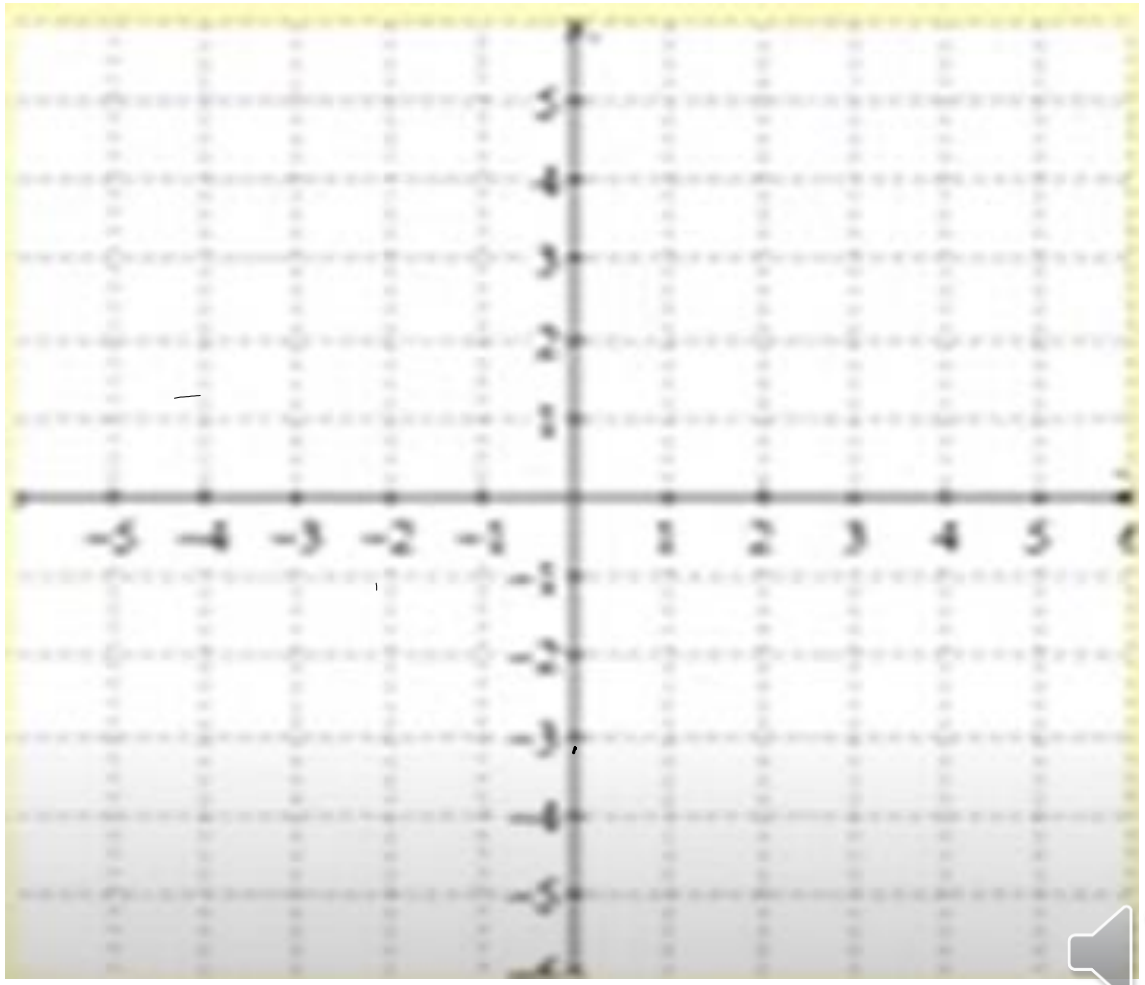


Example 3:

Determine the domine and range

f(x)= $|x| - 3$

x	y



How to determine if a relation or correspondence is a Function

Goal :
Given a relation , determine if is a function

Formal Definition of a Function

A function is a correspondence between a first set , called the domain , and a second set , called the range , such that each member of the domain corresponds to exactly one member of the range .

Domain: set of x-values
Range: set of y-values
Function: If every x-value is paired with exactly 1 y- value

Example :Determine whether or not each correspondence is a function.

Domain		Range
Sep 2006	→	8,729,000
Jan 2007	→	21,066,000
Mar 2007	→	10,549,000
Jun 2007	→	9,815,000

Example:

b) Squaring

Domain		Range
2	→	4
3	→	9
4	↘	
−4	→	16

Example :

c) Baseball Teams

Domain		Range
Arizona	→	Diamondbacks
Chicago	→	Cubs
	↘	White Sox
New York	→	Yankees

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Graphs of Functions

Definition : The graph of a function f is a drawing that represents all the input - output pairs (x , f (x)) .
In cases where the function is given by an equation , the graph of a function is the graph of the equation y = f (x) .

Example : The graph of the cubic polynomial on the real line is { x^3 - 9x): x is a real number } .

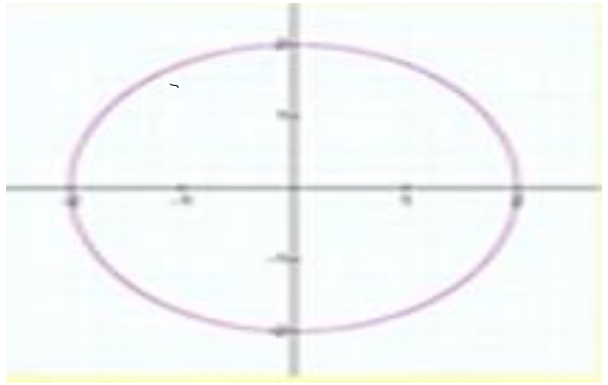
f(x)= $x^2 - 9x$

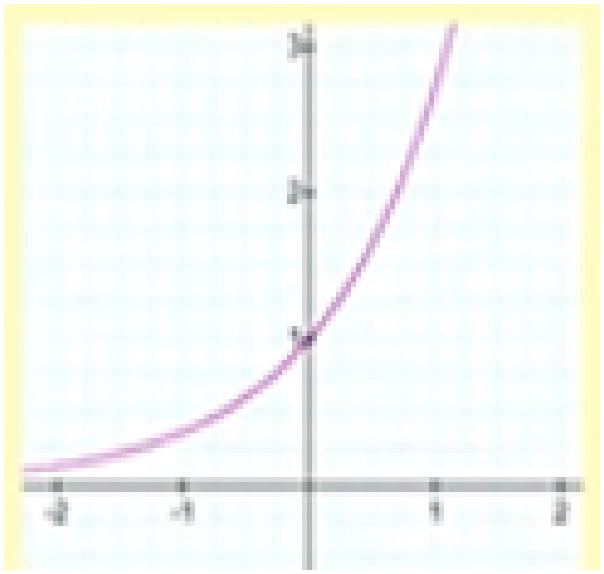
- Determining if the graph of a relation or correspondence is a function

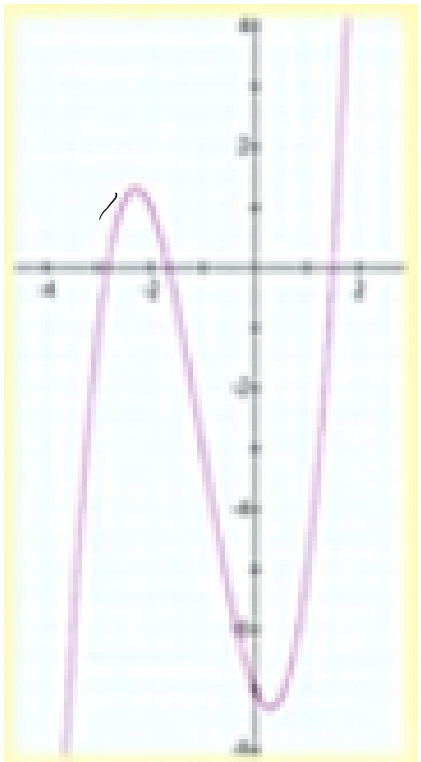
- The Vertical Line Test

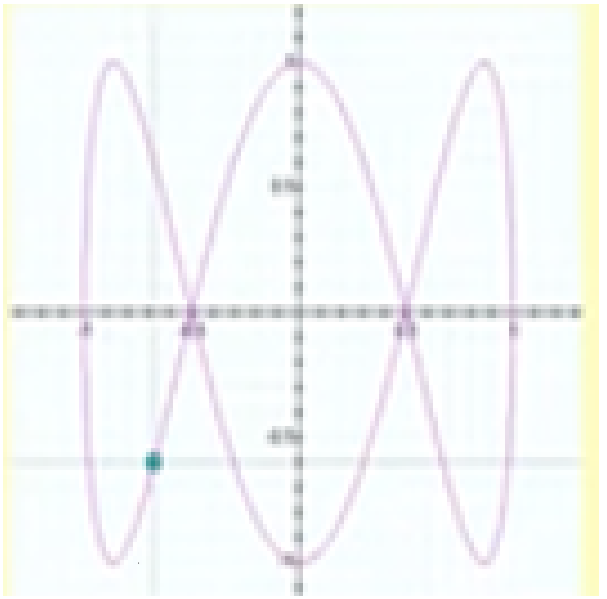
- A graph represents a function if it is impossible to draw a vertical line that intersects the graph more than once.

Example: Determine whether each of the following is the graph of a function.









Determining Domain and Range

The domain of the function is the set of all x - values , or inputs , of the points on the graph .

- The domain can be viewed as the curve's shadow onto the x - axis , or how it behaves from left to right

The range of the function is the set of all y - values , or outputs , of the points on the graph .

- The range can be viewed as the curve's shadow onto the y - axis or how it behaves up and down .

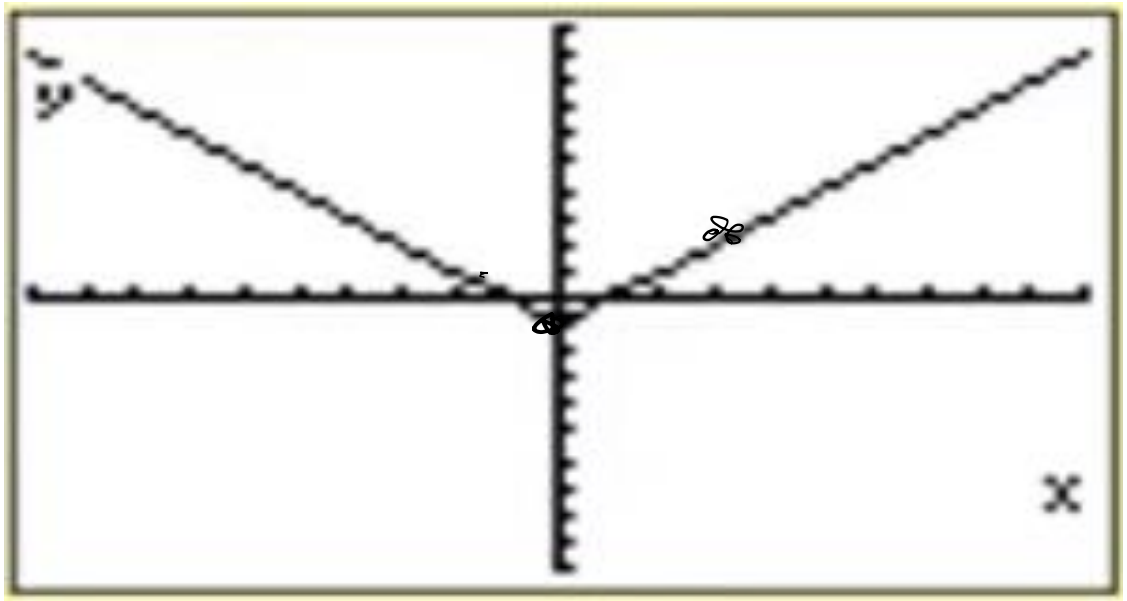
Domain :

Range :

Example: State the domain and range of the following relation. Is the relation a function?
{(2,-3),(4,6),(3,-1),(6,6),(2,3)}

Example: Find the domain and range of given function

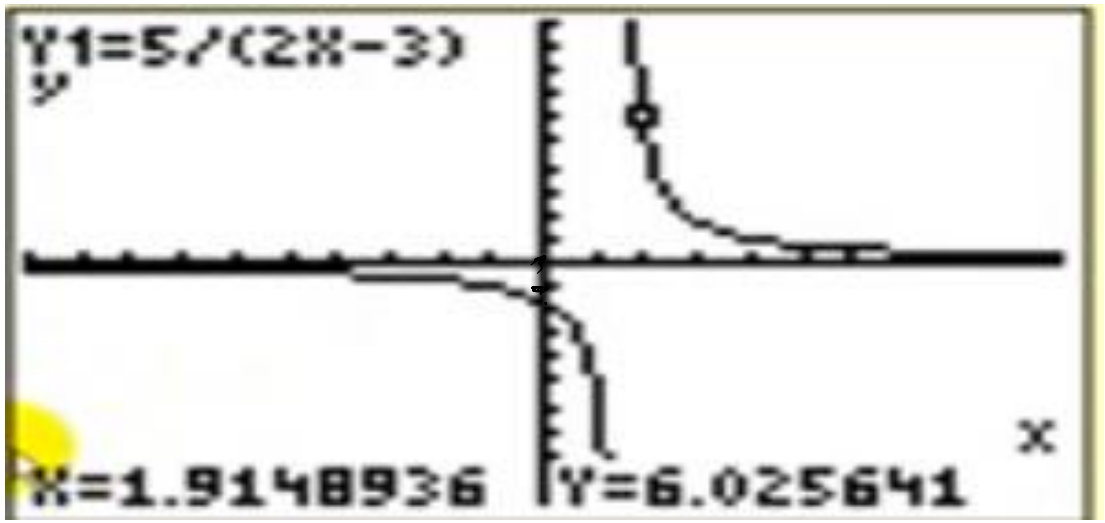
f(x)= $|x| - 1$



Example: Find the domain and range of given function.

$f(x)=\frac{5}{2x-3}$

Graphical method



Algebraic method

Domain:

Range:

Example: Find the domain and range of given function.

f(x)=$\sqrt{4x+2}$

Graphical method

Algebraic method

Domain:

Range: