# MATHEMATICS
CONCEPTS OF FUNCTION

"I do Welcome all of you" for this course

- *Goals of this course* :At the end of this course you will able to know--
1. What a function is all about.
2. Meaning of the function.
3. Two most important ways to identify any expression as a function.
   ➢ Graphical approach
   ➢ Theoritical approach.
4. Examples on function.
5. Exercise on identification of function.

FUNCTION (defination)

- A function can be considered as a relation that maps set of inputs with respective outputs.

- A function f takes an input x, and returns a single output $f(x)$.

INPUT x

FUNCTION f:

OUTPUT f(x)

X^2

X^{22}
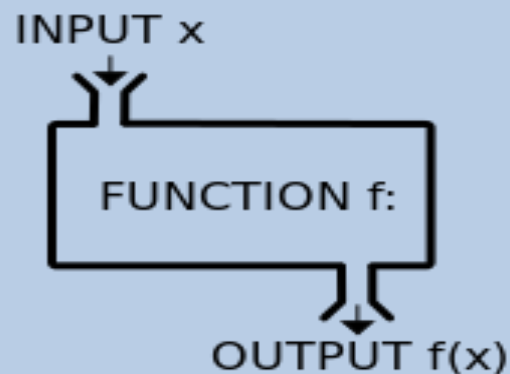
Domain & Range of a function

INPUT x

FUNCTION f:
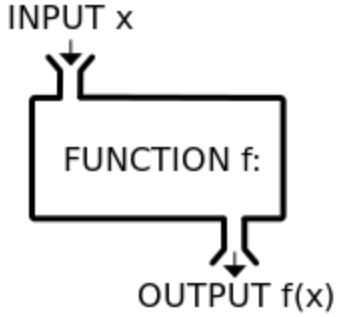
OUTPUT f(x)

➤The input x is known as domain of the function and output f(x) is called its Range.
➤Where x is independent variable & f(x) is a dependent variable.

- *Consider the function   f(x) = x^2*

when x=1 we have f(1)=1

x=2   f(2)=4

x=3   f(3)=9   and so on

- *F(x)* is a function of *x*, and the relation *f(x) = x^2* describes a function. We notice that with such a relation, every value of *x* corresponds to one and only one) value of *y*.

- Defination: So an expression f(x) is said to be a function if and only if one value of x is related to one and only one value of y.

Graphical approach

- ***Graphically if there exist at least one line parellel to y axis which cuts the graph of y=f(x) at more than one point then y=f(x) is NOT a function.***

- *Ex-1   y= x^2 **it is a function.***
-

- *Graph of y= x^2*

- **As** *we can see below the vertical line cuts the graph at only one point so it is a function.*
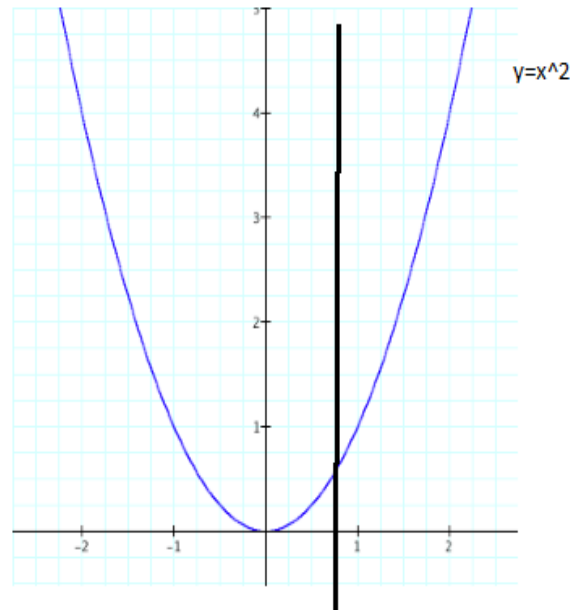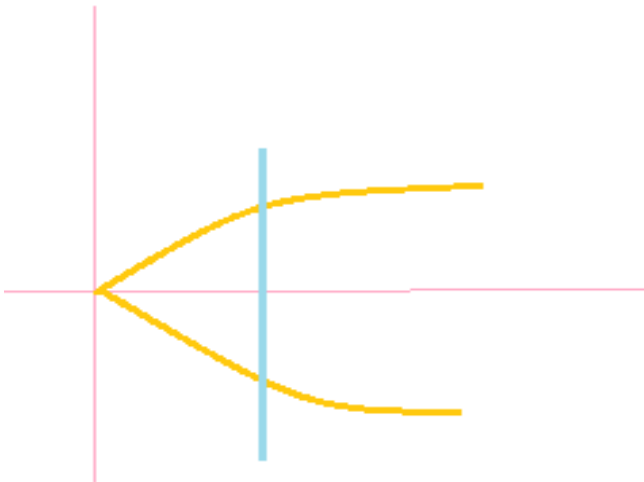
- Ex-2 $y = \sqrt{x}$;it is a function as we can see from the graph that a vertical line cuts it at only one point.
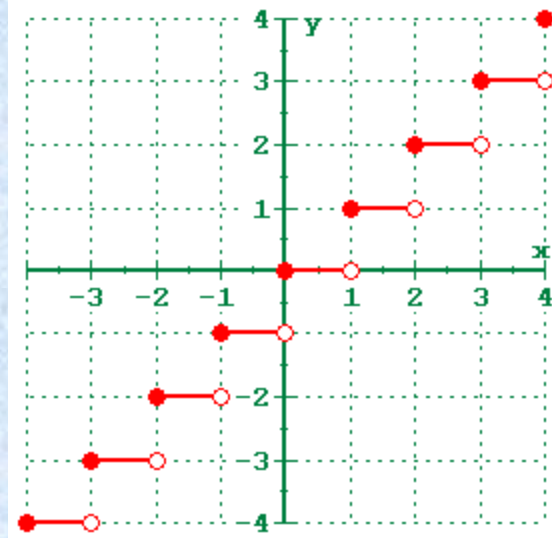
$$y = \sqrt{x}$$
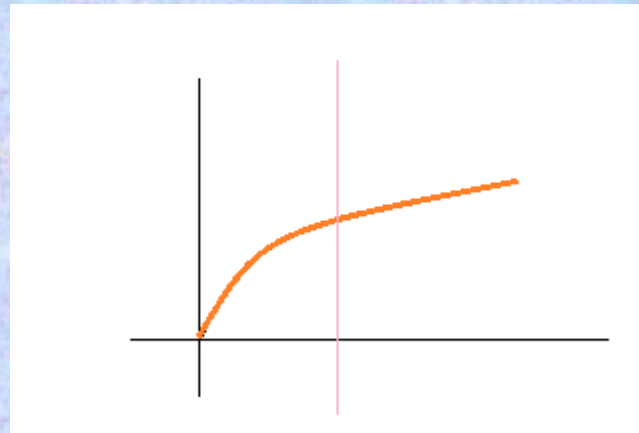
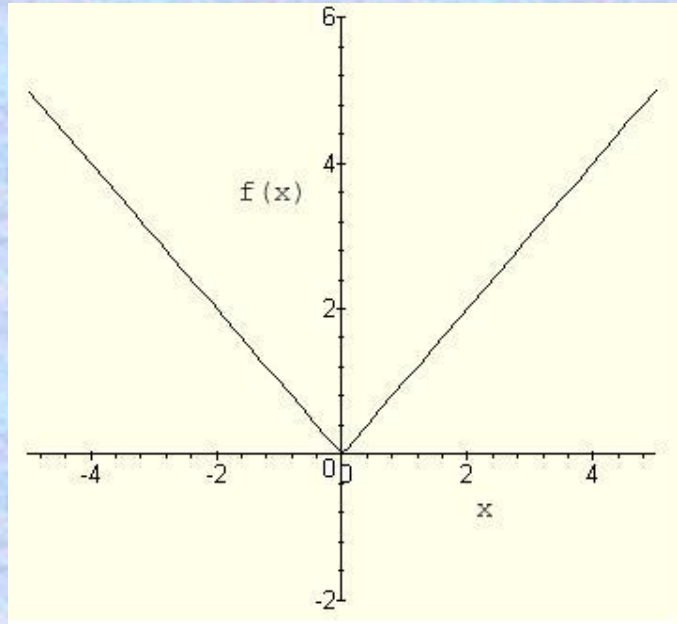Ex-3 $y^2=4x$; it is not a function as shown in the figure below.

- Ex-4   y=[x] ;where [] represent greatest integer function.
- Graph of G.I.F

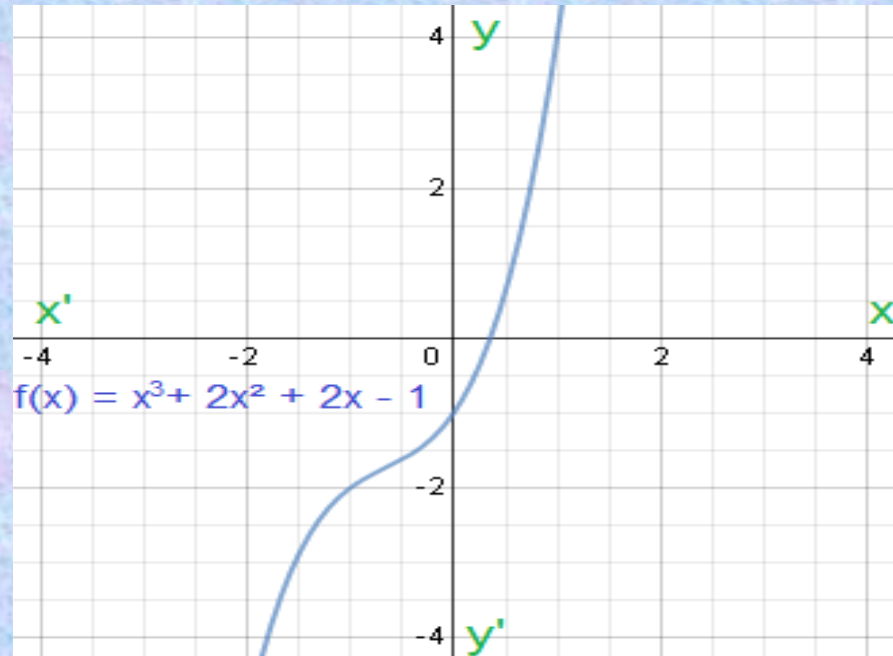- If we draw a vertical line it will cut the graph at a single point so it's a function.

- Ex -5   y=|x|
- Graph of |x|

- It is a function since vertical line will cut it at single point.
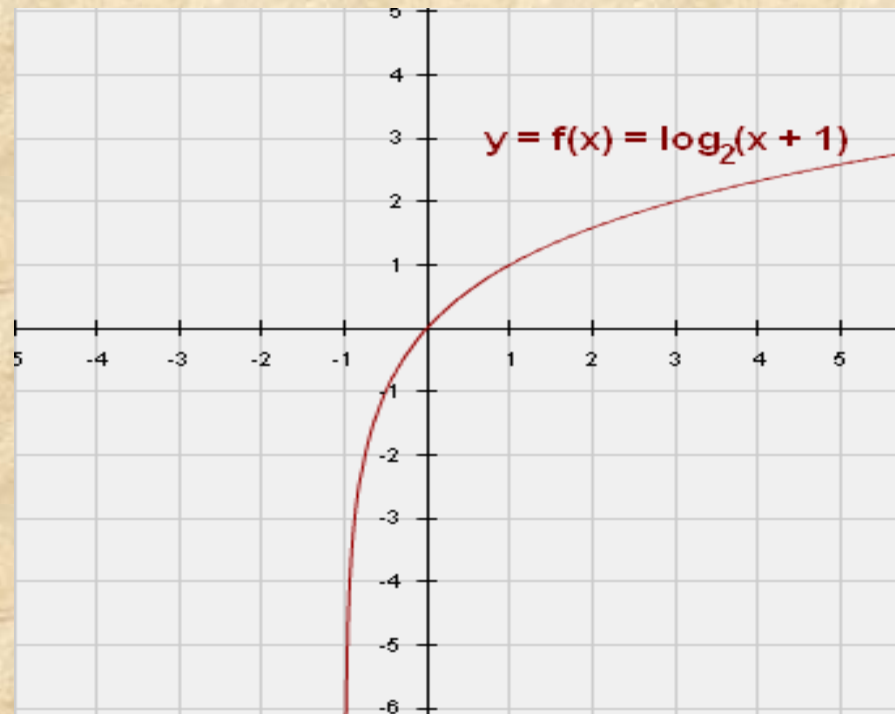
- Ex-6 $f(x) = x^3 + 2x^2 + 2x - 1$

- Graph

$f(x) = x^3 + 2x^2 + 2x - 1$

- so the given polynomial is a function by vertical line concept

- Ex-7

$$F(x)=\log_2^{x+1}$$

$$y = f(x) = \log_2(x + 1)$$

- The vertical line will cut the graph at only one point so the given *expression is a function*

Q. Identify which of the following expression are function.

1. Y={x}

2. y^2=X-2

3. Y=$\sqrt{[X]+2}$

4. Y=X^3+1

5. F(X)=Sin $_X^{-1}$

6. Y=Sig(x)

7. xy=c^2 where c is a constant.

8. y^2=$\tan^{-1} x$+$\cot^{-1} x$ + x