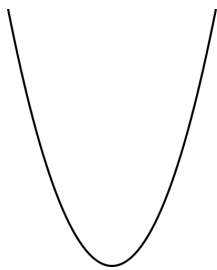
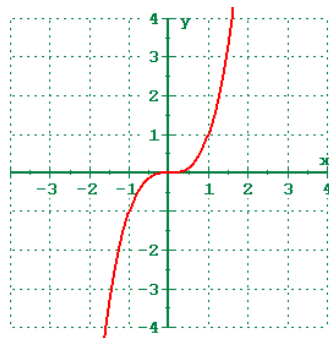


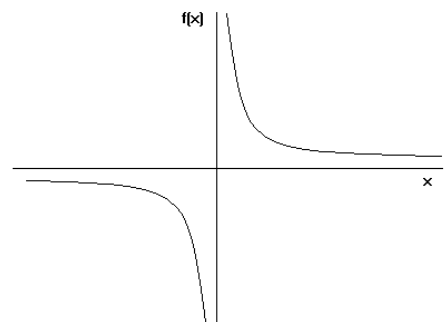
# Unit 1: Functions



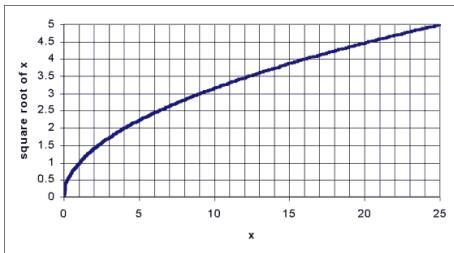
Parabola  
 $y = x^2$



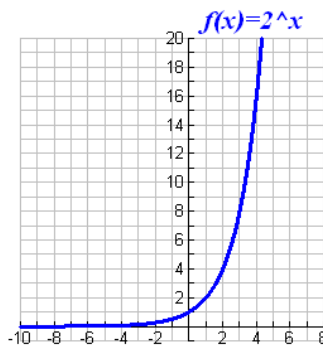
Cubic  
 $y = x^3$



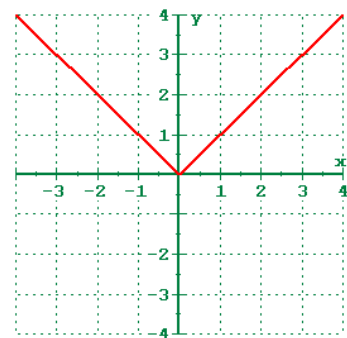
Reciprocal  
 $y = \frac{1}{x}$



Root  
 $y = \sqrt{x}$



Exponential  
 $y = 2^x$



Absolute Value  
 $y = |x|$

## 1.1 : Functions, Domain and Range

### A. Relation vs. Function

Relation: An identified pattern between two variables

Can be represented as ordered pairs, table of values, graphs, equations

ex.  $\{(-3,4), (-2,1), (-2, 7), (5,-3)\}$

Braces  $\{ \}$  are used to represent a set. A set is a collection of items.

Function: A special type of relation in which for every x-value, there is only one corresponding y-value.

**\* All functions are relations but not all relations are functions.**

Ex. 1 Which of the following relations are also functions?

a)

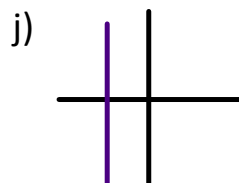
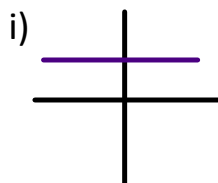
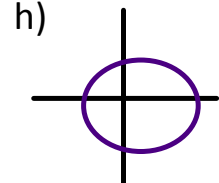
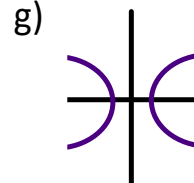
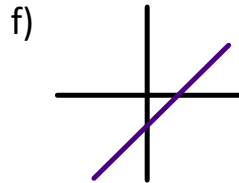
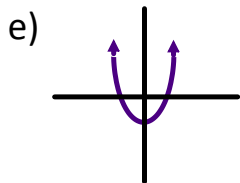
x	y
-3	1
-2	4
-1	5

b)

x	y
-2	4
-3	5
-2	7

c)  $A = \{(3,4), (2,-1), (5,-1), (6,4)\}$

d)  $B = \{(2,2), (3,-4), (2,3), (4,-1)\}$



How can we test if a relation is a function?

|

#### The Vertical Line Test

If a relation is graphed, it is a function if a vertical line crosses in no more than one place anywhere on the graph.

## B. Domain and Range

Domain: The set of all **input** values (usually "x").

These are the values of x that can be used/make sense.

Range: The set of all **output** values (usually "y").

These are the values of y that are possible given the input.

We use **set notation** to describe the domain and range.

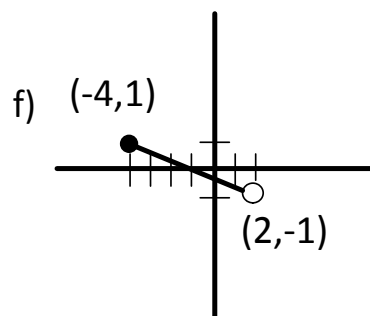
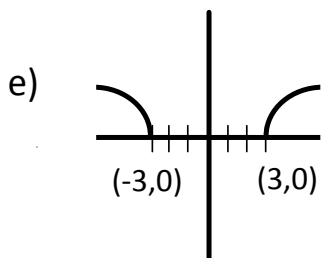
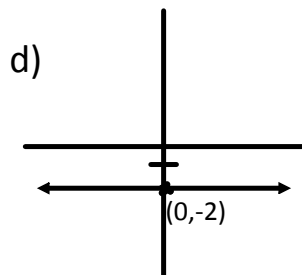
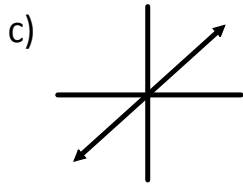
$$D = \{ \quad \} \quad R = \{ \quad \}$$

Ex. 2. State the domain and range.

a)  $\{(0,-3),(1,-4),(2,-3),(5,-1),(7,-4)\}$

b)

x	y
-3	0
-2	1
-1	0
0	1



Closed dot: ● Value exists at that point.

Open dot: ○ Value does not exist at that point.

g)  $y = 5x - 2$

h)  $y = -4(x - 3)^2 + 2$

i)  $x^2 + y^2 = 49$