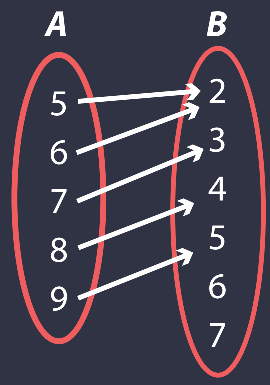
FUNCTIONS

A function is a relation that map each element ***x*** of a set ***A*** with only one element ***y*** of set ***B***

Function ***f: A→B*** is given as

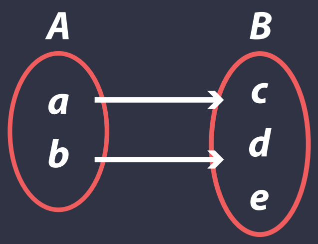
y= f(x)



Types Of Functions

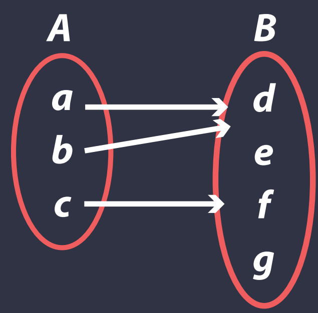
(1) One to one function/ Injective

f: A→B is one to one if every element of ***A*** has distinct image in ***B.***



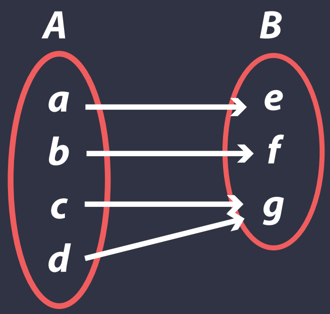
(2) Many to one function

f: A→B is many to one if two or more elements of ***A*** have same image in ***B***



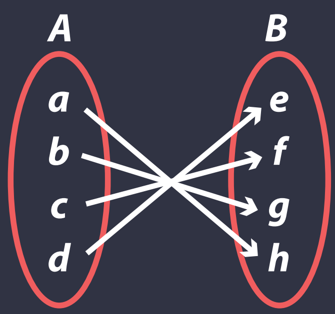
(3) Onto function/ Surjective

f: A→B is onto if every element of ***B*** is related to at least one element of ***A***



(4) One-one and onto function / Bijective

f: A→B is one-one and onto if it satisfies both the condition for one-one and onto



Invertible functions

If

Then

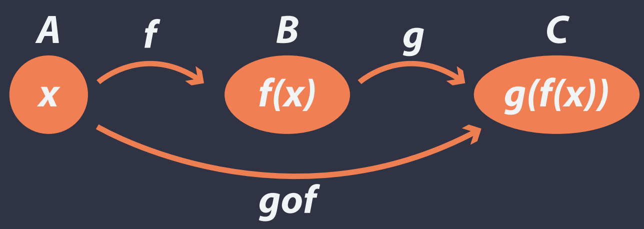
For a function to be invertible it needs to be both one-one and onto function

Composite functions

f: A→B and ***g: B→C*** can be composed to form a function which maps from ***A*** to ***C***.

A composite function is denoted by

(gof)(x): g(f(x))

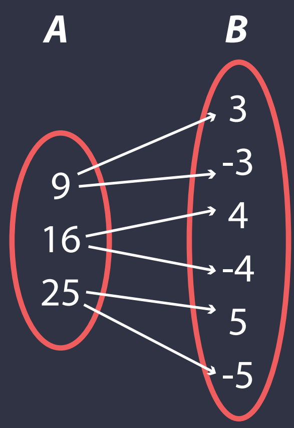


RELATIONS

Relation ***R*** from set ***A*** to set ***B*** is a subset of the cartesian product **A X B** and is derived by describing a relationship between first and second element of the ordered pair ***A X B***

Representation Of Relation

For ***A={ 9, 16, 25}*** ***B={ 5, 4, 3 , -3, -4,-5}***
Here, relation is that elements of ***A*** are square of elements of ***B***



(1) Set buider form

R={ (x,y), x is square of y, x ∈ A and y ∈ B }

(2) In roster form

R={ (9, 3), (9, -3), (16, 4) , (16, -4), (25, 5), (25, -5) }

Number Of Relations

If ***A*** has h elements and **B** has **k** elements then number of relations from ***A*** to ***B*** are 2^{hk}.

Types Of Relation

(1) Universal Relation

Each element of ***A*** is related to every element of ***A***
i.e, ***R= A X A***

(2) Identity Relations/Reflexive

Each element of A is related to itself
i.e, ***R= { (a,a) a ∈ A}***

(3) Inverse Relation

R is a relation from ***A*** to ***B*** then
R^{-1} is inverse relation from ***B*** to ***A***

(4) Symmetric Relation

For a relation ***R***, if ***(a,b) ∈ R*** then ***(b, a) ∈ R; ∀ a, b ∈ A***

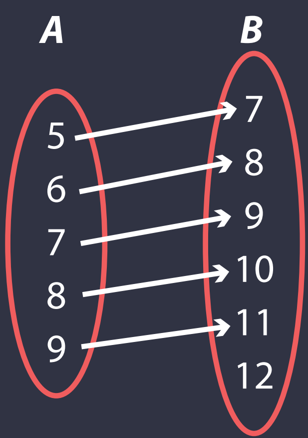
(5) Transitive Relation

For a relation ***R***, if ***(a,b) ∈ R*** , ***(b, c) ∈ R*** then ***(a, c) ∈ R; ∀ a, b, c ∈ R***

(6) Equivalence Relation

A transitive, symmetric and reflexive relation is an equivalence relation.

Terminologies related to Relations



Domain = Collection of elements of ***A***
= {5, 6, 7, 8 , 9}
Co-domain = Collection of elements of ***B***
= {7, 8 , 9, 10, 11,12}
Range = Collection of elements of B related to ***A***
= {7, 8 , 9, 10, 11}