

# Lecture - 3

## Functions

A function is a relation from a set of inputs to a set of possible outputs where each input is related to exactly one output.

## Mathematical

If  $f$  is a function from  $X$  to  $Y$  using the function notation

$$f: X \rightarrow Y$$

# Types of Functions

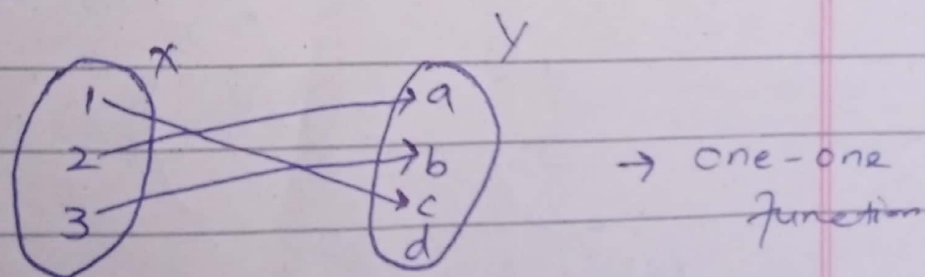
- ① One - one function (Injective)
- ② many - one function
- ③ onto function (Surjective)
- ④ One - one onto function (Bijective)

(1)

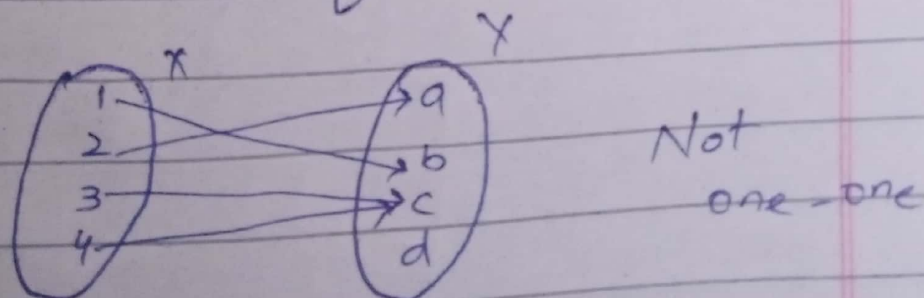
## One - One function (Injective)

A function  $f: X \rightarrow Y$  is said to be one - one (or injective), if each element of 'X' has unique image in 'Y'.

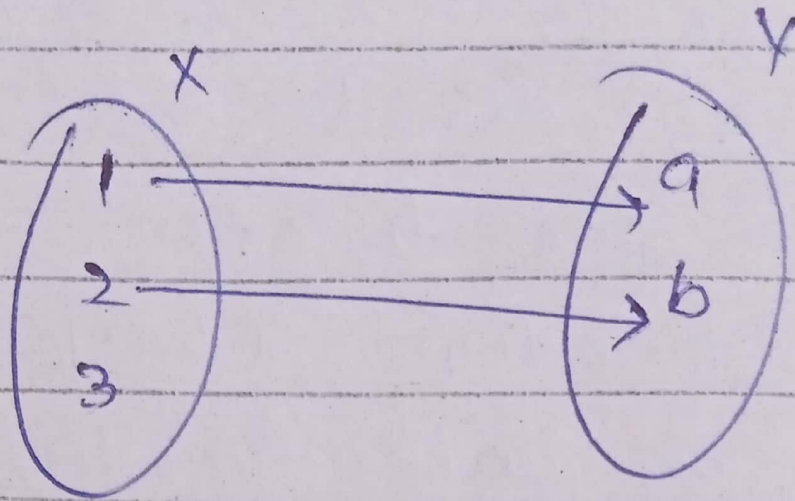
### Example



But if



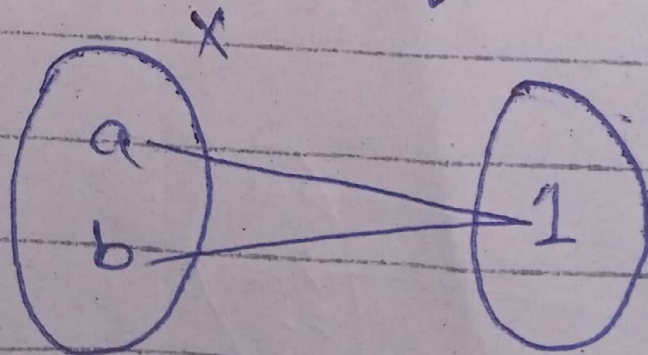
# Another Example



NOT function  
because there is one  
element which is not  
linked.

## Type - II

Many - one function :

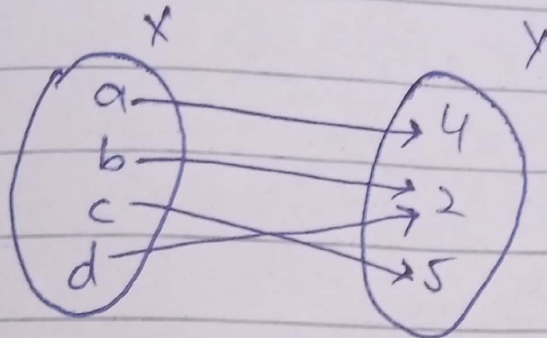


which is not one-one

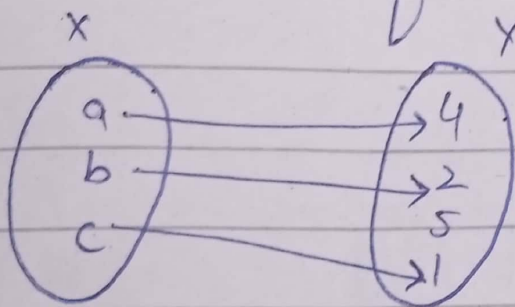
## Type - III

### Onto function (Surjective)

→ All elements in 'Y' are used



Onto function



## Type - IV

### Bijjective (Injective + Surjective)

→ is a function b/w elements of two sets, where each element of one set is paired with exactly one element of other set

