Chapter- 1

Relations And Functions

Types of Relation

Introduction:-

Relation from a set A to B:- Let A and B be two non-empty sets. Then a set R is said to be a relation from set A to set B if R is a subset of $A \times B$. i.e if $R \subseteq A \times B$.

Example:-

Let $R = \{1, 2, 3\}, B = \{2, 3, 4\}$ define $R = \{(a, b) : 2a = b, a \in A, b \in B\}$

Show that R is a relation from A to B. Also find no of possible relations from A to B.

Relation on a set A:- Let A be any non-empty set. Then a set R is said to be a relation on A if R is a subset of $A \times A$. i.e $R \subseteq A \times A$.

Example:-

Let $A = \{1, 2, 3\}$ and define $R = \{(a, b) : 2a = b; a, b \in A\}$. Show that R is a relation on A. What is the possible number of relations on A.

Types of Relation:-

(1) Empty or void relation:- A relation R on the set A is called empty relation if no elements of A are related to any elements of A i.e $R = \phi$.

Example:-

Let $A = \{1, 2, 3\}$, define $R = \{(a, b) : a - b = 12\}$. Show that R is an empty relation on set A.

(2) **Universal Relation:-** A relation R on a set A is called universal relation if each element of A is related to every element of A. i.e if $R = A \times A$.

Example:-

Let $A=\{1,2\}$ and define $R=\{(a,b);a+b>0\}$. Show that r is a universal relation on set A.

Note:- Void and universal relations are called trivial relations.

(3) **Identity Relation:-** A relation R on set A is called identity relation if every element of A is related to itself only. i.e if $R=\{(a,a):a\in A\}$. The identity relation on set A is denoted by I_A.

Example:-

Let A ={1, 2, 3}, and the relation R defined by $R=\{(a,b):a-b=0;a,b\in A\}$. Show that R is an identity relation.

(4) Reflexive Relation:- A relation R on the set A is called reflexive relation if a R a for every $a\in A$. i.e if $(a,a)\in R$ for every $a\in A$.

Example:-

Let A = {1, 2, 3}. Define the relation R_1, R_2, R_3 on A as.

(i) $R_1=\{(1,1),(2,1),(2,2),(3,1),(3,2),(3,3)\}$ (ii) $R_2=\{(1,2),(1,3),(2,3)\}$

(iii) $R_3=\{(1,1)\}$

Check whether R_1, $R_{2,}$ and R_3 are reflexive or not.

Example:-

The relation "equal to" in the set of Natural numbers is reflexive.

Note:- Identity and universal relations are reflexive, but empty relation is not reflexive. All reflexive relations are not an identity relation.

(5) Symmetric Relation:- A relation R on the set a is called symmetric relation if aRb implies b R a, for every $a,b \in A; \text{if } (a,b) \in R \Rightarrow (b,a) \in R$, $a,b \in A$.

Example:-

Let A = {1, 2, 3} define the relation R_1, R_2 and R_3 on A as.

(i) $R_1 = \{(1,1),(2,2),(1,2),(2,1)\}$ (ii) $R_2 = \{(1,1),(2,2),(3,3)\}$

(iii) $R_3 = \{(1,1),(2,2),(1,2),(2,1),(3,1)\}$

Check whether R_1, R_2, and R_3 are symmetric or not.

Example:-

The relation parallel to in the set of the lines in a plane is symmetric.

Note:-

- Identity and universal relation are symmetric
- Empty relation is also symmetric as there is no situation in which $(a,b) \in R$.

(6) Transitive Relation:- A relation R on the set A is called transitive relation if aRb and b R c imply a R c, for every $a,b,c \in A$. i.e if $(a,b) \in R \,\&\, (b,c) \in R \Rightarrow (a,c) \in R$ for every $a,b,c \in A$.

Example:-

Let $A = \{1,2,3\}$, define R_1, R_2, R_3, R_4 on A as

(i) $R_1 = \{(1,1),(1,2),(2,1),(2,2)\}$ (ii) $R_2 = \{(1,1),(2,2)\}$

(iii) $R_3 = \{(1,1),(1,2),(2,3)\}$ (iv) $R_4 = \{(1,2),(1,3)\}$

Check R_1, R_2, R_3, and R_4 are transitive or not.

Example:-

The relation greater than on R is transitive.

Note:- If there is no situation in which $(a, b) \in R$ and $(b, c) \in R$, then the relation is transitive

Equivalence Relation and Equivalence Class

Equivalence Relation:- A relation R on a set A is called equivalence relation if R is reflexive, symmetric, and transitive.

Equivalence Class: - Let R be an equivalence relation on set A and let $a \in A$. Then we define the equivalence class of 'a' as

$$[a] = \{b \in A : b \text{ is related to } a\}$$

$$= \{b \in A : (b, a) \in R\}$$

Example:-

$A = \{1, 2, 3\}$. Define the relations R_1, R_2, R_3, and R_4 on A as.

(i) $R_1 = \{(1,1), (1,2), (2,1), (2,2)\}$ (ii) $R_2 = \{(1,1), (2,2), (3,3), (1,2), (2,3), (1,3)\}$

(iii) $R_3 = \{(1,1), (2,2), (3,3), (1,2), (2,1), (1,3), (3,1)\}$

(iv) $R_4 = \{(1,1), (2,2), (3,3), (1,2), (2,1)\}$

Check whether R_1, R_2, R_3, and R_4 are equivalence relations or not, if yes, then find the equivalence classes of all elements of set A.

Example:-

Prove that the relation R on Z, defined by $(a, b) \in R \Leftrightarrow a - b$ is divisible by 5 is an equivalence relation on Z.

Example:-

Show that the relation R on IR defined as $R = \{(a,b) : a \le b^2\}$ is neither reflexive not symmetric nor transitive.

Example:-

Show that the relation R defined by $(a,b)R(c,d) \Rightarrow a+b=b+c,$ in $A \times A$ where $A = \{1,2,3,.....,10\}$ is an equivalence relation. Hence write the equivalence class $[(3,4)]; a,b,c,d \in A$.

Example:-

Write the smallest and largest equivalence relation on the set $A = \{1,2,3\}$

Example:-

For the set $A = \{1,2,3\}$, define a relation R on the set A as follows.

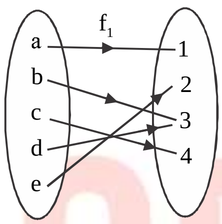
$R = \{(1,1),(2,2),(3,3),(1,3)\}$ write the ordered pair to be added to R to make it the smallest equivalence relation.

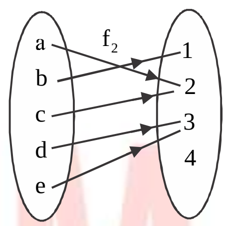
Types of Function

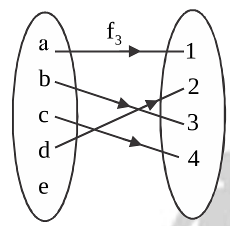
Function from set A to set B:- Let A and B be two non-empty sets, then a function f from set A to set B is a rule (or map or correspondence) which associates each element of set A to exactly one element of set B. If f is a function from set A to set B, then we denote it by $f : A \to B$.

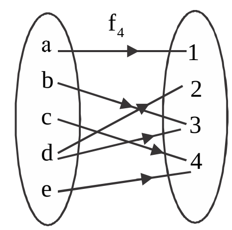
Example:-

Check whether the maps in the following diagram are functions or not.

(i) 

(ii) 

(iii) 

(iv) 

Domain, Co-domain, and Range of a function:-

Let $f : A \to B$ be function, then

(i) The set A is called the domain of function 'f'

(ii) The set B is called co-domain of 'f'

(iii) The set of all images of elements of set A under f is called range under f.

Note:-

(1) The range of A under f is denoted by f(A).

(2) If $f(a) = b$ then, b is called an image of a under f, and a is called pre-image of b.

(3) The range is always a subset of the co-domain.

(4) If $n(A) = p, n(B) = q$, then the number of functions from A to B is $(q)^p$

Types of Functions:-

(1) One-one function or Injective function:- A function $f: A \rightarrow B$ is said to be one-one if no two elements of A have the same image. i.e if $a \neq b \Rightarrow f(a) \neq f(b)$ for all $a, b \in A$

Or $f(a) = f(b) \Rightarrow a = b$ for all $a, b \in A$.

Note:-

(i) If a function $f: A \rightarrow B$ is not one-one then it is called many-one function

(ii) if a function $f: A \rightarrow B$ is one-one then $n(A) \leq n(B)$

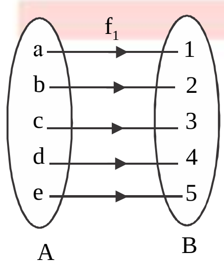
(iii) If $n(A) = p, n(B) = q$, then no of one-one function from A to B

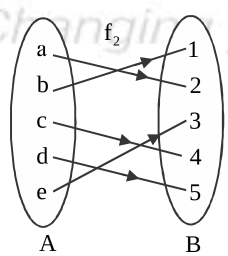
$$= \begin{cases} 0, & \text{if} \quad p > q \\ {}^{q}P_{p} = \dfrac{q!}{(q-p)}, & \text{if} \quad p \leq q \end{cases}$$

Example:-

Check whether the function in the diagram are one-one or not.

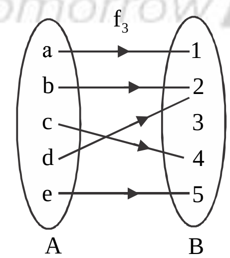
(i)





(ii)

(iii)



On to function or subjective function:-

A function $f: A \to B$ is said to be onto if, for each $b \in B$, there exists $a \in A$ such that $f(a) = b$, we say that 'a' is pre-image of 'b'. In other words, f is onto if Range of f = co-domain of f, i.e if every element in B has a pre-image in A.

Note:-

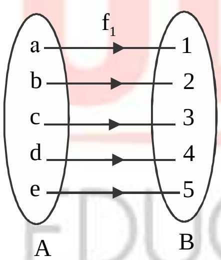
(i) If a function $f: A \to B$ is not onto then it is called into function.

(ii) If a function $f: A \to B$ is onto then $n(A) \geq n(B)$

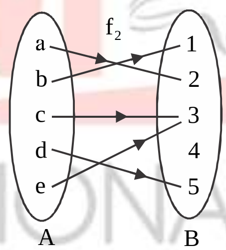
(iii) Let A be any finite set $n(A) = p$ then no of onto function from A to A is p!

Example:-

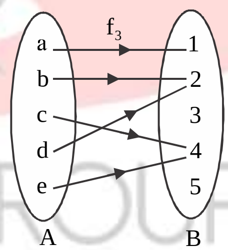
(i)



(ii)



(iii)



Check whether functions in the figure are onto?

Bijective Function:-

A function $f: A \to B$ is said to be bijective if it is both one-one and onto.

Examples:-

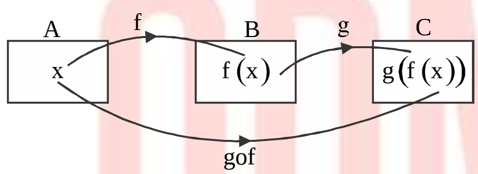
Let $A=\{1,2,3,4\}$ and $B=\{5,6,7,8\}$ let $f:A\rightarrow B$ be defined by $f=\{(1,5),(2,6),(3,7),(4,8)\}$.

Show that f is one-one and onto (bijective).

Composition of Function:-

The composition of two functions is a chain process in which the output of the first function becomes the input of the 2nd function. Let $f:A\rightarrow B$ and $g:B\rightarrow C$ be two functions.

Exactly one element for every $x\in A$, there is exactly one element $f(x)\in B$. For $f(x)\in B$, there is exactly one element $g(f(x))\in C$. This result is a new function from A to C as shown in the figure.



Definition:-

Let $f:A\rightarrow B$ and $g:B\rightarrow C$ be any two functions. Then the composition of f and g is a function $gof:A\rightarrow C$ defined as $(gof)(x)=g(f(x))$.

Examples – 01

If $f:R\rightarrow R$ and $g:R\rightarrow R$ are given by $f(x)=\cos x$ and $g(x)=5x^2$. Find gof and fog show that $fog\neq gof$.

Examples-02

Let $f:\{2,3,4,5\}\rightarrow\{3,4,5,9\}$ and $g:\{3,4,5,9\}\rightarrow\{7,11,15\}$ be functions defined by

$f=\{(2,3),(3,4),(4,5),(5,5)\}$

$g=\{(3,7),(4,7),(5,11),(9,11)\}$

Then find gof. Whether fog is defined or not.

Notes:-

- The composition gof exists if the range of $f \subseteq$ domain of g.
- The composition fog exists if the range of $g \subseteq$ domain of f.
- It may be possible gof exists but fog does not exist
- gof and fog may or may not be equal.

Properties of the composition of Functions:-

(1) Composition of functions is associative Let $f : A \to B, g : B \to C \text{ and } g : C \to D$ then $(hog)of = ho(gof)$

(2) Let $f : A \to B$ and $g : B \to C$ be two functions.

(i) If both are one-one then gof is one-one

(ii) If both are onto then gof is onto.

(3) Let $f : A \to B$ and $g : B \to C$ be two functions such that $gof : A \to C$

(i) If gof is onto, then g is onto

(ii) If gof is one-one then f is one-one

(iii) If gof is onto and g is one-one then f is onto

(iv) If gof is one-one and f is onto then g is one-one

Problems to work out:-

(1) If the mapping f and g are given by $f=\{(1,2),(3,5),(4,1)\}, g=\{(2,3),(5,1),(1,3)\}$ write fog and gof.

(2) Find gof and fog when $f:R\to R$ and $g:R\to R$ are defined by $f(x)=5x+2 \text{ and } g(x)=x^2+6$

(3) Let $f,g:R\to R$ be two functions defined as $f(x)=|x|+x \text{ and } g(x)=|x|-x, \forall x\in R$ then find $fog(-3) \text{ and } gof(-2)$.

(4) Let $f:R\to R$ be signum function as $f(x)=\begin{cases}1 & \text{if} \quad x>0\\ 0 & \text{if} \quad x=0\\ -1 & \text{if} \quad x<0\end{cases}$ and $g:R\to R$, be the greatest integer function given by $g(x)=[x]$. Do fog and gof coincide in $(0,1]$?

Solution:-

Let $x\in(0,1)$ be any element

$fog(x)=f(g(x))$

$=f([x])$

$=f(0) \text{ as } x\in(0,1)$

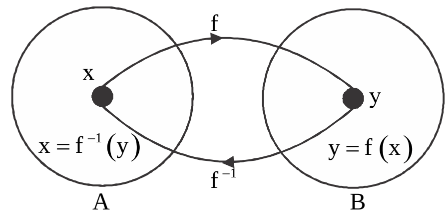
$=0$

Also $(gof)(x)=g(f(x))=g(1)=[1]=1$ as $x\in(0,1)$

$\therefore (fog)(x)\neq(gof)(x)$ for every $x\in(0,1)$; so fog and gof does not coincide in $(0,1]$

The inverse of a Function:-

Let f be a one-one and on-to function from A to B. Let y be an arbitrary element of B. Then f being onto, there exists an element $x \in A$. Such that $f(x) = y$, Also f being one-one this x must be unique. Thus for each $y \in B$, there exists a unique element $x \in A$ such that $f(x) = y$. So we may define a function denoted by f^{-1} as $f^{-1} : B \to A$. Such that $f^{-1}(y) = x \Leftrightarrow f(x) = y$.



The function f^{-1} is called the inverse of f.

Definition (1)

Let $f : A \to B$ be both one-one & onto function, then $f^{-1} : B \to A$ is a function which associates to each y of B, a unique x of A such that $f(x) = y$ is called the inverse of function f.

$\therefore f^{-1}(y) = x \Leftrightarrow f(x) = y$

Definition (2)

Another definition of the inverse function. Let $f : A \to B$ be one-one and onto function, then the function $g : B \to A$ such that $gof = I_A$ and $fog = I_B$, where I_A and I_B are identity functions on A and B respectively, is called the inverse of f i.e $g = f^{-1}$.

Notes:-

- If the inverse of a function f exists then f is called an invertible function.
- A function f is invertible if and only if f is one-one and onto.
- The two definitions of the Inverse function given above are equivalent.
- The domain of f^{-1} = Range of f and range of f^{-1} = domain of f.
- $(f^{-1}of)(x) = x, \forall x \in$ domain of f i.e $f^{-1}of$ is an identity function.
- $(f^{-1})^{-1} = f$
- If f is one-one and onto then f^{-1} is also one-one and onto.

Working Rule to find Inverse of a Function:-

Let $f : A \to B$ defined by $y = f(x)$

Step – I:- Prove that f is one-one i.e take $f(x_1) = f(x_2)$ and show that $x_1 = x_2$

Step – II:- Prove that f is onto i.e for any $y \in B$, there exists $x \in A$ s.t. $f(x) = y$

Step – III:- Find x in terms of y from $y = f(x)$ let $x = g(y)$ then $g(y) = f^{-1}(y)$

Example -1

Consider $f : R \to R$ given by $f(x) = 4x + 3$. Show that f is invertible, find the inverse of f.

Example-2

Show that $f : R \to R$ given by $f(x) = x^2 + 1$ is not invertible.

Properties:-

(1) If $f : X \to Y$ $g : Y \to Z$ are be two invertible functions. Then gof is also invertible with $(gof)^{-1} = f^{-1}og^{-1}$.

(2) If $f : X \to Y$ is invertible, then its inverse is unique.

(3) If $f : X \to Y$ is invertible then $f^{-1}of = I_X$ and $fof^{-1} = I_Y$

(4) Let $f : X \to Y$ and $g : Y \to X$ be two functions such that $gof = I_X$ and $fog = I_Y$ then f and g are bijections and $g = f^{-1}$.

Example-3

If $A = \{a, b, c, d\}$ and the function $f = \{(a, b), (b, d), (c, a), (d, c)\}$. Write f^{-1}.

Example-4

Consider $f:\{1,2,3\}\to\{a,b,c\}$ given by $f(1)=a, f(2)=b, f(3)=c$. Show that $\left(f^{-1}\right)^{-1}=f$.

Example – 5

If $f(x)=\frac{4x+3}{6x-4}, x\neq\frac{2}{3}$ show that $fof(x)=x$ for all $x\neq\frac{2}{3}$. What is the inverse of f?

Problem – 01

Let $f:N\to N$ be defined by $f(n)=\begin{cases}\frac{n+1}{2}, & \text{if } n \text{ is odd}\\ \frac{n}{2}, & n \text{ is even}\end{cases}$ for all $n\in N$. State whether the function is bijective justify your answer.

Problem – 02

Show that the modulus function $f:R\to R$, given by $f(x)=|x|$ is neither one-one nor onto.

Solution:-

For one-one $f(3)=|3|=3$ $\quad f(-3)=|-3|=3$

As $f(3)=f(-3)$ but $3\neq-3$ so f is not one-one

For onto $\text{Range } f = R^{+}U\{0\}$ Co-dom of f = R

As Range $f\neq$ co-dom f so f is not onto

Problem – 3

Consider $f:R_{+}\to[-5,\infty)$, given by $f(x)=9x^2+6x-5$.

Show that f is invertible wth $f^{-1}(y)=\frac{\sqrt{y+6}-1}{3}$

Problem – 4

Give an example of a function

(i) Which is one-one but not onto

(ii) Which is not one-one but onto

(iii) Which is neither one-one nor onto.

Solution:-

(i) Let $A=\{1,2\}, B=\{4,5,6\}$ and let $f=\{(1,4),(2,5)\}$. Since every element of A has different images is B so f is one-one. Also, the element $6\in B$ does not have a pre-image is A. So f is not onto

(ii) Let $A=\{1,2,3\}, B=\{4,5\}$ and $g=\{(2,4),(1,4),(3,5)\}$ Since $1,2\in A$ have same image 4 is B. So g is not one-one. Also, every element of in B has a pre-image is A, so g is onto

(iii) $A=\{1,2,3\}, B=\{4,5\}$ and $h=\{(1,4),(2,4),(3,4)\}$. Since elements $1,2,3\in A$ have the same image 4 in B. So h is not one-one. Also, the element $5\in B$ does not have a pre-image in A so h is not onto.

Problem – 5

Show that a one-one function $f:\{1,2,3\}\rightarrow\{1,2,3\}$ must be onto.

Solution:- Give that $f:A\rightarrow B$ is a one-one function. Where $A=B=\{1,2,3\}$.

Since $f:A\rightarrow B$ is one-one

$\therefore n(A) \le n(B)$……………………………….(1)

Suppose that $f: A \to B$ is not onto

$\therefore n(A) < n(B)$………………………………….(2)

So from (1) and (2), we get $n(A) < n(B)$ which is a contradiction, as $n(A) = n(B) = 3$.

Hence f is onto

Problem – 6

Show that an onto function $f: \{1,2,3\} \to \{1,2,3\}$ is always one-one

Solution:-

Given that $f: A \to B$ is onto,

Where $A = B = \{1,2,3\}$

Since $f: A \to B$ is onto

$n(A) \ge n(B)$…………………………….(1)

Suppose that $f: A \to B$ is not one-one

$n(A) \ge n(B)$……………………………..(2)

From (1) and (2) we get $n(A) > n(B)$ which is a contradiction as $n(A) = n(B) = 3$

Hence f is one-one.

Problem -7:-

(a) Write total number of functions from {1, 2} to {x, y, z}

Answer:- $(3)^2 = 9$ as no of functions from A to B is $\left[n(B)\right]^{n(A)}$

(b) Write total number of one-one functions from {1, 2} to {x, y, z}

Answer:- ${}^3P_2 = \dfrac{3!}{(3-2)!} = 6$

(c) Find the total number of onto functions from set {x, y, z} to {1, 5, 25, 125}.

Answer:- 0 As n(A) < n(B) so no of onto function is 0

(d) Find the total number of bijective functions from set {x, y, z} to $\{\alpha, \beta, \gamma\}$

Answer:- 3! As n(A) = n(B) = n, no of bijectiions

(e) if f(x) = |x| and g(x) = [x] find (fog) (-1.5) and (gof) (-1.5)

Answer:- 2 ; 1

Problem - 8:-

If the function $f: R \to R$ be defined by $f(x) = 2x - 3$ and $g: R \to R$ by $g(x) = x^3 + 5$. Then find fog and show that fog is invertible. Also find $(fog)^{-1}$, Hence find $(fog)^{-1}(9)$.

Solution:-

Here $f: R \to R$ defined by $fog(x) = f(g(x)) = f(x^3 + 5) = 2(x^3 + 5) - 3 = 2x^3 + 7$. Now to prove fog is invertible. One-one:- Let $x_1, x_2 \in R$ and $(fog)(x_1) = (fog)(x_2)$

$\Rightarrow 2x_1^3 + 7 = 2x_2^3 + 7$

$\Rightarrow x_1^3 = x_2^3 \Rightarrow x_1 = x_2$

So fog is one-one Onto:- let $y \in R$ be any element then $fog(x) = y$

$\Rightarrow 2x^3 + 7 = y$

$\Rightarrow 2x^3 = y - 7 \Rightarrow x^3 = \frac{y-7}{2}$

$\Rightarrow x = \sqrt[3]{\frac{y-7}{2}}$ .... (1)

For every, $y \in R$ we have $x \in R$ so fog is onto.

Thus, fog is an invertible function so $(fog)^{-1} : R \to R$ exists and from (1)

$(fog)^{-1}(y) = \sqrt[3]{\frac{y-7}{2}}; (fog)^{-1}(9) = \sqrt[3]{\frac{9-7}{2}} = 1$

Problem - 9:-

If the function $f(x) = \sqrt{2x-3}$ is I veritable, then find f^{-1}. Hence prove that $(fof^{-1})(x) = x$.

Solution:-

Given $f : R \to R$ defined by $f(x) = \sqrt{2x-3}$

One-one: Let $x_1, x_2 \in R$ and $f(x_1) = f(x_2)$

$\Rightarrow \sqrt{2x_1 - 3} = \sqrt{2x_2 - 3}$

$\Rightarrow 2x_1 - 3 = 2x_2 - 3$

$\Rightarrow x_1 = x_2$

So f is one-one

Onto:- Let $y \in R$ be any element then $f(x) = y$

$\Rightarrow \sqrt{2x-3} = y$

$\Rightarrow 2x-3 = y^2$

$\Rightarrow x = \frac{y^2+3}{2}$ ………………………….(1)

So f is onto. Thus f is on invertible function so $f^{-1}: R \to R$ exists and from (1) we have

$f^{-1}(y) = \frac{y^2+3}{2}$

The inverse of f is given by $f^{-1}(x) = \frac{x^2+3}{2}$

Now $(fof^{-1})(x) = f(f^{-1}(x))$

$= f\left(\frac{x^2+3}{2}\right) = \sqrt{2\left(\frac{x^2+3}{2}\right)-3}$

Problem - 10:-

Consider $f: N \to N, g: N \to N$ and $h: N \to R$ defined as $f(x) = 2x$, $g(y) = 3y+4$ and $f(x) = \sin x$ for all $x, y, z \in N$. Show that $ho(gof) = (hof)of$

Solution:-

Given $f: N \to N$, defined by $f(x) = 2x; g: N \to N$ defined by

$g(y) = 3y+4$ and $h: N \to R, h(x) = \sin x$

Now $ho(gof): N \to R$ such that $[ho(gof)](x) = h[gof(x)]$

$= h(g(f(x))) = h(g(2x))$

$=h\left[3(2x)+4\right]$

$=h(6x+4)$

$=\sin(6x+4)$

Also $(hog)of:N\to R$ such that $\left[(hog)of\right](x)=(hog)(f(x))$

$=(hog)(2x)=h(g(2x))$

$=h\left[3(2x)+4\right]$

$=h(6x+4)=\sin(6x+4)$

Hence, $\left[ho(gof)\right](x)=\left[(hog)of\right](x);\forall x\in N$

Example:-11

Let $f:R\to R$ be the signum function defined as $f(x)=\begin{cases}1 & \text{if} \quad x>0\\ 0 & \text{if} \quad x=0\\ -1 & \text{if} \quad x<0\end{cases}$ and $g:R\to R$ be the greatest integer function given by $g(x)=|x|$. Do fog and gof coincide in (0, 1]?

Solution:-

Given $f:R\to R$ $f(x)=\begin{cases}1 & \text{if} \quad x>0\\ 0 & \text{if} \quad x=0\\ -1 & \text{if} \quad x<0\end{cases}$ and $g:R\to R$ defined by $g(x)=|x|$

Let $x\in(0,1)$ be any element

Then $(fog)(x)=f(g(x))$

$=f(|x|)$

$= f(0) = 0$

Also $(gof)(x) = g(f(x))$

$= g(1) = [1] = 1$

$\therefore$ $(fog)(x) \neq (gof)(x)$, for every $x \in (0,1]$ Hence, fog and gof do not coincide in $(0,1)$

Example:-12

Let $A = \{1,2,3\} and B = \{5,6,7\}$. Let the functions $f : A \to B and g : A \to B$ be defined by $f = \{(1,5),(2,6),(3,7)\}$ and $g = \{(2,5),(1,6),(3,7)\}$. Show that $f \neq g$.

Solution:-

Given $A = \{1,2,3\} and B = \{5,6,7\}$

Also, given that $f = \{(1,5),(2,6),(3,7)\} and g = \{(2,5),(1,6),(3,7)\}$

Since, $f(1) = 5 \neq g(1)$

Therefore, $f(x) \neq g(x)$ for some $x \in A$. Hence, $f \neq g$