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<u>Relations and Functions.</u>

Q.1. Define relations and gives an example.

Ans. Relation: →

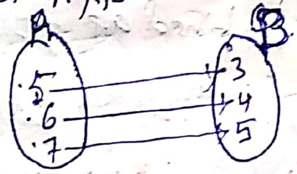
Let A be a non-empty set and $R \subseteq A \times A$. Then, R is called a relation on A.

If $(a,b) \in R$, we say that a is related to b and we write, aRb. If $(a,b) \notin R$, then $a \not R b$.

OR, Relation: →

A relation R from a non-empty set A to a non-empty set B is a subset of the Cartesian product $A \times B$.

For example.



Since, $R = \{(x,y) : y = x-2,\ x \in A \text{ and } y \in B\}$

$R = \{(5,3), (6,4), (7,5)\}$

Here, domain $= \{5,6,7\}$ and Range $= \{3,4,5\}$

We see that the set of all first elements of the ordered pairs in a relation R from a set A to a set B is called the domain of the relation R.

The set of all second elements in a relation R from a set A to a set B is called the range of the relation R.

Q.2. Define functions and gives an example.

Ans. Function: → A relation f from a set A to a set B is said to be a function if every element of set A has one and only one image in set B.

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OR, Function:→ Let A and B be two non-empty sets. Then, a relation f from A to B which associates to each element $x \in A$, a unique element.

$f(x) \in B$ is called a function from A to B and we write $f: A \to B$

A is called the domain of f and we write ~~dom f~~. dom(f) = A and B is called the co-domain of f.

Also, $\{f(x): x \in A\} \subseteq B$ is called the range of f, written as range (f).

For example, Let $A = \{1, 2, 3\}$, $B = \{4, 5, 6, 7\}$ and ~~set~~ let $f = \{(1,4), (2,5), (3,6)\}$ be a function from A to B.

It is given that $A = \{1, 2, 3\}$ and $B = \{4, 5, 6, 7\}$

Now, $f: A \to B$ is defined as $f = \{(1,4), (2,5), (3,6)\}$.

$\therefore$ $f(1) = 4$, $f(2) = 5$, $f(3) = 6$.

which is one-one function.

Q.3. Define equivalence relation and equivalence class.

Soln: Equivalence relation:→ A relation R on a set A is called an equivalence relation, if it is reflexive, symmetric and transitive.

Equivalence class:→ Let R be an equivalence relation on a non-empty set A and let $a \in A$. Then, [a] is the equivalence class determined by a and defined as $[a] = \{x \in A : (a, x) \in R\}$.