

RELATION AND FUNCTION

INTRDUCTION

RELATION:

A relation R is the subset of the cartesian product of $X \times Y$, where X and Y are two non-empty elements. It is derived by stating the relationship between the first element and second element of the ordered pair of $X \times Y$. The set of all primary elements of the ordered pairs is called a domain of R and the set of all second elements of the ordered pairs is called a range of R .

FUNCTION:

A relation ' P ' is said to be a function, if every element of a non-empty set X , has only one image or range to a non-empty set Y

NOTE

Two ordered pair X and Y are equal, if and only if the corresponding first elements and second elements are equal

EXAMPLE SUMS

Q.1: The Cartesian product $A \times A$ has 9 elements among which are found $(-1, 0)$ and $(0, 1)$. Find the set A and the remaining elements of $A \times A$.

Solution:

We know that,

If $n(A) = p$ and $n(B) = q$, then $n(A \times B) = pq$

From the given,

$$n(A \times A) = 9$$

$$n(A) \times n(A) = 9,$$

$$n(A) = 3 \dots\dots(i)$$

The ordered pairs $(-1, 0)$ and $(0, 1)$ are two of the nine elements of $A \times A$.

Therefore, $A \times A = \{(a, a) : a \in A\}$

Hence, $-1, 0, 1$ are the elemets of A(ii)

From (i) and (ii),

$$A = \{-1, 0, 1\}$$

The remaining elements of set $A \times A$ are $(-1, -1)$, $(-1, 1)$, $(0, -1)$, $(0, 0)$, $(1, -1)$, $(1, 0)$ and $(1, 1)$.

Q.2: Express the function $f: A \rightarrow \mathbb{R}$, $f(x) = x^2 - 1$, where $A = \{-4, 0, 1, 4\}$ as a set of ordered pairs.

Solution:

Given,

$$A = \{-4, 0, 1, 4\}$$

$$f(x) = x^2 - 1$$

$$f(-4) = (-4)^2 - 1 = 16 - 1 = 15$$

$$f(0) = (0)^2 - 1 = -1$$

$$f(1) = (1)^2 - 1 = 0$$

$$f(4) = (4)^2 - 1 = 16 - 1 = 15$$

Therefore, the set of ordered pairs = $\{(-4, 15), (0, -1), (1, 0), (4, 15)\}$

PRATICE SUMS

Q.1 Assume that $A = \{1, 2, 3, \dots, 14\}$. Define a relation R from A to A by $R = \{(x, y) : \exists x - y = 0, \text{ such that } x, y \in A\}$. Determine and write down its range, domain, and codomain

Q.2 Let $f(x) = x^2$ and $g(x) = 2x + 1$ be two real functions. Find $(f + g)(x)$, $(f - g)(x)$, $(fg)(x)$, $(f/g)(x)$