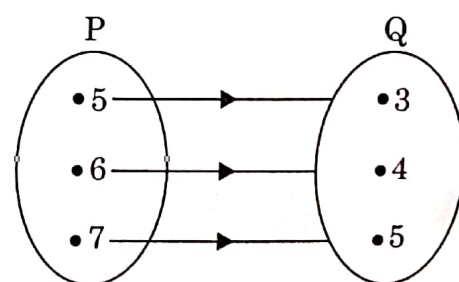


Long Answer-I Type Questions (4 Marks)

- The Cartesian product $A \times A$ has 9 elements among which are found the elements $(-1, 0)$ and $(0, 1)$. Find A and the remaining elements of $A \times A$.
- Let $A = \{1, 2, 3, 5\}$ and $B = \{4, 6, 9\}$. Define a relation from A to B by $R = \{(x, y) : \text{difference between } x \text{ and } y \text{ is odd, } x \in A, y \in B\}$. Write R in roster form.
- If $f(x) = \frac{5x+3}{4x-5}, x \neq \frac{5}{4}$, show that $f(f(x))$ is an identity function.
- Let $A = \{1, 2\}$, $B = \{1, 2, 3, 4\}$, $C = \{5, 6\}$ and $D = \{5, 6, 7, 8\}$. Verify that
(i) $A \times (B \cap C) = (A \times B) \cap (A \times C)$. (ii) $A \times C$ is a subset of $B \times D$.
- Relations R_1 and R_2 are defined on the set Z of integers as follows:
 $(x, y) \in R_1 \Rightarrow x^2 + y^2 = 25$ and $(y, x) \in R_2 \Rightarrow x^2 + y^2 = 25$. Write R_1 and R_2 as set of ordered pairs and hence find their respective domains.
- Find the domain of the function $f(x) = \sqrt{4-x} + \frac{1}{\sqrt{x^2-1}}$.
- A relation R is defined from a set $A = \{2, 3, 4, 5\}$ to a set $B = \{3, 6, 7, 10\}$ as follows:
 $\{(x, y) \in R \Leftrightarrow x \text{ divides } y\}$. Express R as a set of ordered pairs and determine the domain and range.
- Find the domain for which the functions $f(x) = 2x^2 - 1$ and $g(x) = 1 - 3x$ are equal
- Given $A = \{-1, 0, 2, 5, 6, 11\}$, $B = \{-2, -1, 0, 18, 28, 108\}$ and $f(x) = x^2 - x - 2$. Find $f(A)$.
Is $f(A) = B$?
- The arrow diagram shows a relationship between the sets P and Q . Write this relation in
(i) set-builder form
(ii) roster form. What is its domain and range?
- Is $g = \{(1, 1), (2, 3), (3, 5), (4, 5)\}$ a function? If this function is described by the formula $g(x) = \alpha x + \beta$, what are the values of α and β ?
- Find the domain and range of the function $f(x) = \sqrt{1-x^2}$.
- Find the domain of the function $f(x) = \sqrt{x} + \sqrt{x-1} + \sqrt{x-2}$.
- Find the domain and the range of the function $f(x) = \frac{x}{1+x^2}$.



Very Short Answer/Short Answer Type Questions (1 Mark/2 Marks)

1. If $\left(\frac{x}{2} + 1, y - \frac{2}{3}\right) = \left(\frac{3}{2}, \frac{1}{3}\right)$, find the values of x and y .
2. If $f(x) = x^2$ and $g(x) = 2x + 1$ are two real functions, find $(f + g)(x)$.
3. What is the domain of the real valued function $f(x) = \frac{1}{3x - 2}$?
4. If $A \times B = \{(a, x), (a, y), (b, x), (b, y)\}$, find A and B .
5. $A = \{1, 2, 3, 4\}$ and $B = \{4, 6, 9\}$. Define a relation R from A to B by $R = \{(x, y): \text{the difference between } x \text{ and } y \text{ is odd, } x \in A \text{ and } y \in B\}$. Write R in roster form.

Long Answer-I Type Questions (4 Marks)

1. Find the domain and range of the function $f(x) = \frac{1}{1 - x^2}$.
2. If $f(x) = \frac{x - 1}{x + 1}$, where is a real function, then prove that $f(2x) = \frac{3f(x) + 1}{f(x) + 3}$.
3. Let $A = \{1, 2, 3, \dots, 14\}$. Define a relation R from A to A by $R = \{(x, y): 3x - y = 0, \text{ where } x, y \in A\}$. Write domain, co-domain and range.
4. Find the domain and range of the real function $f(x) = \sqrt{9 - x^2}$.