

CLASS –XI
ASSIGNMENT- 1

SUBJECT – MATHEMATICS
TOPIC– RELATIONS & FUNCTIONS

- Q1. If $A = \{2, 3\}$, $B = \{4, 5\}$, $C = \{5, 6\}$ Find (i) $A \times B$ (ii) $A \times (B \cup C)$ (iii) $A \times (B \cap C)$
Find (i) $A \times (B \cup C) = (A \times B) \cup (A \times C)$
(ii) $A \times (B - C) = (A \times B) - (A \times C)$
- Q2. If the ordered pairs $(x, -1)$ and $(5, y)$ belong to the set $\{(a, b) : b = 2a - 3\}$, find the values of x and y .
- Q3. If A and B are two sets having 3 elements in common. If $n(A) = 5$, $n(B) = 4$, find $n(A \times B)$ and $n(A \times B) \cap (B \times A)$
- Q4. Determine the domain and range of the following relations:-
(i) $R_1 = \left\{ \left[x, \frac{1}{x} \right] : 0 < x < 6, x \in \mathbb{N} \right\}$ (ii) $R_2 = \left\{ \left[x, x^3 \right] : x \text{ is a prime number less than } 10 \right\}$
- Q5. Write all possible relation from $A = \{1, 2\}$ to $B = \{0\}$.
- Q6. How many relations are possible from a set A of n elements to another set B of n elements ?
- Q7. Find the domain for which the functions $f(x) = 3x^2 - 1$ and $g(x) = 3 + x$ are equal.
- Q8. Express the following functions as set of ordered pairs and determine their ranges.
(a) $f : A \rightarrow \mathbb{R}$, $f(x) = x^2 + 1$, where $A = \{-1, 0, 2, 4\}$
(b) $g : A \rightarrow \mathbb{N}$, $g(x) = 2x$, where $A = \{x : x \in \mathbb{N}, x \leq 10\}$
- Q9. Let a function f be defined by $f(x) = \frac{x}{x^2 + 1}$, $x \in \mathbb{R}$
Find (i) $f\left(\frac{1}{x}\right)$ $x \neq 0$ (ii) $f(2x)$ (iii) $f(x - 1)$
- Q10. If $f(x) = \frac{x-1}{x+1}$, $x \neq -1$, then show that $f(f(x)) = \frac{-1}{x}$, provided that $x \neq 0$
- Q11. Let $f(x) = x^2$ and $g(x) = 2x + 1$ be two real functions find (i) $(f + g)(x)$ (ii) $(f - g)(x)$ (iii) $(f \cdot g)(x)$ (iv) $\left(\frac{f}{g} \right)(x)$
- Q12. If a real function f is defined by $f(x) = (|x| - x) / 2x$, find its range.

Q13. Find the domain of each of the following real valued functions :-

(i) $f(x) = \frac{1}{x+2},$

(ii) $f(x) = \frac{x-1}{x-3},$

(iii) $f(x) = \frac{2x-3}{x^2-3x+2},$

(iv) $f(x) = \frac{x^2+3x+5}{x^2-5x+4},$

(v) $f(x) = \sqrt{x-2},$

(vi) $f(x) = \frac{1}{\sqrt{1-x}},$

(vii) $f(x) = \sqrt{4-x^2},$

Q14. Find the domain and range of the real function f(x) given by

(i) $f(x) = \frac{x-2}{3-x}$

Ans. D = $\mathbb{R} - \{3\}$ Range = $\mathbb{R} - \{-1\}$

(ii) $f(x) = \frac{1}{\sqrt{x-5}}$

Ans. D = $(5, \infty)$ Range = $(0, \infty)$

(iii) $f(x) = \sqrt{16-x^2}$

Ans. D = $[-4, 4]$ Range = $[0, 4]$

(iv) $f(x) = \frac{x}{1+x^2}$

Ans. D = $(\mathbb{R})$ Range = $[-\frac{1}{2}, \frac{1}{2}] - \{0\}$

(v) $f(x) = \frac{3}{2-x^2}$

Ans. D = $\mathbb{R} - \{-\sqrt{2}, \sqrt{2}\}$ Range = $(\infty, 0) \cup [3/2, \infty]$

(vi) $f(x) = \frac{x^2-9}{x-3}$

Ans. D = $\mathbb{R} - \{3\}$ R = $\mathbb{R} - \{6\}$

Q15. If $R = \{(x, y): x, y \in \mathbb{I}, 4x^2 + 8y^2 = 36\}$, then represent R by arrow diagram.

Q16. Give $A = \{-2, -1, 0, 1, 2\}$ and $B = \{-3, -1, 1, 5\}$. List all elements of $f = \{(x, y) : y = 2x^2 - 3, x \in A, Y \in B\}$. Is f a function ?