

CLASS – XII

MATHEMATICS

ASSIGNMENT NO. 2

TOPIC – relations and functions

- Q1. Let n be a fixed positive integer. Define a relation R on Z as follows $(a, b) \in R \Leftrightarrow a-b$ is divisible by n . Show that R is an equivalence relation on Z .
- Q2. Let z be the set of integers show that the relation $R = \{(a, b) : a, b \in \mathbb{Z} \text{ and } a + b \text{ is even}\}$ is an equivalence relation on z .
- Q3. Let S be a relation on the set R of real numbers defined by $S = \{(a, b) \in R \times R : a^2 + b^2 = 1\}$ prove that S is not an equivalence relation R .
- Q4. Show that the relation R on the set R of real numbers defined as $R = \{(a, b) : a < b^2\}$ is neither reflexive nor symmetric nor transitive.
- Q5. Show that the relation R on R defined as $R = \{(a, b) : a \leq b\}$ is reflexive and transitive but not symmetric.
- Q6. Show that $f : R \rightarrow R$, defined as $f(x) = x^3$, is a bijection.
- Q7. Show that the modulus function $f : R \rightarrow R$, given by $f(x) = [x]$ is neither one-one nor on-to.
- Q8. Show that the function of $F : R \rightarrow R$ given by $f(x) = x^3 + x$ is a bijection.
- Q9. Let $A = R - [2]$ and $B = R - [1]$. If $f : A \rightarrow B$ is a mapping defined by $f(x) = \frac{x-1}{x-2}$, show that f is bijective.
- Q10. Show that $f : R \rightarrow R$, given $f(x) = x - [x]$, is neither one-one or onto.
- Q11. Let $f(x) = [x]$ and $g(x) = [x]$, Find
- (i) $(g \circ f) \left(\frac{5}{3} \right)$ (ii) $(f \circ g) \left(\frac{5}{3} \right)$ (iii) $(f+g)(-1)$
- Q12. If $f(x) = \frac{3x-2}{2x-3}$, prove that $f(f(x)) = x$ for all $x \in R - \left\{ \frac{3}{2} \right\}$
- Q13. Find $f \circ g$ and $g \circ f$, if (i) $f(x) = e^x$, $g(x) = \log_e x$ (ii) $f(x) = x + 1$, $g(x) = 2x + 3$
- Q14. Prove that the function $f : R \rightarrow R$ defined by $f(x) = 2x-3$ is invertible find f^{-1} .
- Q15. Let $F : N \rightarrow R$ be a function defined as $f(x) = 4x^2 + 12x + 15$. Show that $f : N \rightarrow \text{Range}(f)$ is invertible. Find the inverse of f .
- Q16. Show that $f : [-1, 1] \rightarrow R$, given by $f(x) = \frac{x}{x+2}$ is one-one, find the inverse of the function $f : (-1, 1) \rightarrow \text{Range}(f)$.
- Q17. Let ' x ' be a binary operation on set $2 - [1]$ defined by $a \times b = a + b - ab$; $a, b \in Q - [1]$. Find the identity element with respect to on Q . Also, prove that every element of $Q - [1]$ is invertible.
- Q18. Consider the binary operation $\square$ on the set $3 = \{1, 2, 3, 4, 5\}$ defined by $A \square B = \text{Minimum of } a \text{ and } B$. Write the composition table of a and b .