

Assignment-IRM

Instructions

- Write your information (name, id, section department etc.) on the front page.
- Submit a PDF version of this file using the link : <https://forms.gle/4devZDwgeYVFtTym7> by the mentioned date.
- Name your pdf file as "YourName_ID". e.g., *Raj_1022*

Deadline: within 26/11/2024

Solve all the problems:

1. On the set $\{a, b, c, d\}$, a relation $Q = \{(a, b), (b, c), (c, d), (d, a)\}$ is defined. Is Q symmetric?
2. Determine whether the relation $R = \{(1, 3), (3, 5), (5, 3), (5, 7)\}$ on the set $\{1, 3, 5, 7\}$ is reflexive, symmetric, or transitive.
3. On the set $\{2, 4, 6, 8\}$, a relation $S = \{(2, 4), (4, 6), (6, 8), (8, 2)\}$ is defined. Then S is:
4. On the set $\{1, 2, 3, 4\}$, a relation $P = \{(1, 2), (2, 3), (3, 4)\}$ is defined. Is P transitive?
5. The relation $R = \{(x, y) : x, y \in \mathbb{Z}, x \neq y\}$ is defined on \mathbb{Z} . What properties does the relation R have?
6. Consider the relation $S = \{(x, y) : x, y \in \mathbb{Z}, x = y + 1\}$ on \mathbb{Z} . Is S reflexive, symmetric, and transitive?
7. On the set \mathbb{Z} of integers, define a binary relation R by aRb if and only if $a - b$ is divisible by 7. Show that R is an equivalence relation.
8. Consider a relation P on \mathbb{Z} , where aPb if and only if $a - b$ is divisible by 4. Prove that P is an equivalence relation.
9. A relation ρ on the set of integers \mathbb{Z} is defined by $\rho = \{(a, b) \mid a, b \in \mathbb{Z} \text{ and } |a - b| \leq 5\}$. Is the relation reflexive, symmetric, and transitive?
10. If $B = \{-3, -2, -1, 0, 1\}$ and $g : B \rightarrow \mathbb{R}$ is defined as $g(x) = x^2 - 1$, then $g(B) = ?$
11. Given $C = \{0, 1, 2, 3\}$ and the function $h : C \rightarrow \mathbb{R}$ defined as $h(x) = x^3 + 2x$, calculate $h(C)$.
12. Prove that the function $f(x) = 5x + 9$, where $f : \mathbb{R} \rightarrow \mathbb{R}$, is injective and surjective.
13. Show that the function $h : \mathbb{R} \rightarrow \mathbb{R}$ defined by $h(x) = 3x + 4$, for $x \in \mathbb{R}$, is injective and surjective.
14. If $f, g : \mathbb{R} \rightarrow \mathbb{R}$ where $f(x) = ax + b$, $g(x) = 1 - x + x^2$, and $(g \circ f)(x) = 9x^2 - 9x + 3$, find the values of a and b .
15. Given that $f, g : \mathbb{R} \rightarrow \mathbb{R}$ with $f(x) = 2x - 4$ and $g(x) = x^2 - 5x + 6$, find the values of a and b if $(g \circ f)(x) = 4x^2 - 8x + 2$.