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MM 20

Relations & Functions

Time 45 Minutes

1 Mark Each

Paper prepared by

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1. Show that the relation R in the set $\{1,2,3\}$, given by $R = \{(1, 1), (2, 2), (3, 3), (1, 2), (2, 3)\}$ is reflexive but not symmetric.
2. Let $f: \mathbb{R} \rightarrow \mathbb{R}$ is defined by $f(x) = |x|$. Is function f onto? Give reasons.

4 Marks Each

3. Let T be the set of the all triangles in a plane with R a relation in T given by $R = \{(T_1, T_2) : T_1 \text{ is congruent to } T_2\}$. Show that R is an equivalence relation.
4. Find the inverse function of $f(x) = \frac{x-1}{x+1}$, $x \neq -1$ and verify that $f \circ f^{-1}$ is an identity function.
5. Consider the binary operation $*$: $\mathbb{R} \times \mathbb{R} \rightarrow \mathbb{R}$ and o : $\mathbb{R} \times \mathbb{R} \rightarrow \mathbb{R}$ defined as $a * b = |a - b|$ and $aob = a$, $\forall a, b \in \mathbb{R}$. Show that $a*(boc) = (a*b) o (a*c)$, $\forall a, b, c \in \mathbb{R}$.

6 Marks

6. Let $f: \mathbb{R} \rightarrow \mathbb{R}$ be defined by $f(x) = 3x + 2$. Show that f is invertible, find $f^{-1}: \mathbb{R} \rightarrow \mathbb{R}$.

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