Answer to Question #87694 – Math – Discrete Mathematics

Question

Let A = {1, 2, 3, 4} and let R be a relation on A such that R = {(1, 1),(2, 2),(3, 3),(4, 4),(1, 2),(2, 3),(1, 3)}

Is R transitive? Symmetric? Reflexive?

Solution

For a relation $R \subset A \times A$ we have

(i) R is reflexive if for each $a \in A$ we have $(a, a) \in R$,
(ii) R is symmetric if for each $(a, b) \in R$ we have $(b, a) \in R$,
(iii)R is transitive if $(a, b) \in R$ and $(b, c) \in R$ implies $(a, c) \in R$.

Thus, for the set $A = \{1,2,3,4\}$ and relation $R = \{(1,1), (2,2), (3,3), (4,4), (1,2), (2,3), (1,3)\}$ we have

(i) R is reflexive since $(1,1), (2,2), (3,3), (4,4) \in R$,
(ii) R is not symmetric since $(1,2) \in R$ but $(2,1) \notin R$,
(iii)R is transitive since there is no $(a, b) \in R$ and $(b, c) \in R$ such that $(a, c) \notin R$.
Answer: transitive, not symmetric, reflexive.