## TYPES OF RELATIONS:

Properties of relations:

Let R be a relation on the set A

1) **Reflexive** : R is reflexive if : $\forall a \in A \rightarrow aRa$ or $(a,a) \in R$ ; $\forall a, b \in A$. Thus R is not reflexive if there exists $a \in A$ such that $(a, a) \notin R$.

2) **Symmetric** : $aRb \rightarrow bRa \ \forall a,b \in A$. if whenever $(a, b) \in R$ then $(b, a) \in R$.

Thus R is not symmetric if there exists $a, b \in A$ such that $(a, b) \in R$ but $(b, a) \notin R$.

3) **Transitive** : $aRb \wedge bRc \rightarrow aRc$. that is, if whenever $(a, b)$, $(b, c) \in R$ then $(a, c) \in R$. Thus R is not transitive if ther e exist $a, b, c \in R$ such that $(a, b)$, $(b,c) \in R$ but $(a, c) \notin R$.

4) **Equivalence relation** : it is Reflexive & Symmetric & Transitiv e. That is, R is an equivalence relation on S if it has the followig three properties:

     a - For every $a \in S$, $aRa$.

     b- If $aRb$, then $bRa$.

     c- If $aRb$ and $bRc$, then $aRc$.

5) **Irreflexive** : $\forall a \in A \ (a,a) \notin R$

6) **AntiSymmetric** : if $aRb$ and $bRa \rightarrow a=b$

     the relations $\geq, \leq$ and $\subset$ are antisymmetric