Show that the relation R in the set $\{1,2,3\}$ given by $R = \{(1,2),(2,1)\}$ is symmetric but neither reflexive nor transitive.

Solution:

$A = \{1,2,3\}$

$R = \{(1,2),(2,1)\}$

$(1,1),(2,2),(3,3) \notin R$

$\therefore$ R is not reflexive.

$(1,2) \in R$ and $(2,1) \in R$

$\therefore$ R is symmetric.

$(1,2) \in R$ and $(2,1) \in R$

$(1,1) \in R$

$\therefore$ R is not transitive.

R is symmetric, but not reflexive or transitive.