Show that the relation R in the set R of real numbers, defined as $R = \{(a,b) : a \leq b^2\}$ is neither reflexive nor symmetric nor transitive.

**Solution:**

$R = \{(a,b) : a \leq b^2\}$

$\left(\dfrac{1}{2}, \dfrac{1}{2}\right) \notin R$ because $\dfrac{1}{2} > \left(\dfrac{1}{2}\right)^2$

$\therefore R$ is not reflexive.

$(1,4) \in R$ as $1 < 4$. But $4$ is not less than $1^2$.

$(4,1) \notin R$

$\therefore$ R is not symmetric.

$(3,2)(2,1.5) \in R$      [Because $3 < 2^2 = 4$ and $2 < (1.5)^2 = 2.25$]

$3 > (1.5)^2 = 2.25$

$\therefore (3,1.5) \notin R$

$\therefore$ R is not transitive.
R is neither reflective nor symmetric nor transitive.