

Question 4: Let a relation R be defined by $R = \{(4, 5); (1, 4); (4, 6); (7, 6); (3, 7)\}$ then $R^{-1} \circ R$ is _____.

Solution:

First find R^{-1} ,

$$R^{-1} = \{(5, 4); (4, 1); (6, 4); (6, 7); (7, 3)\}.$$

Obtain the elements of $R^{-1} \circ R$.

Pick the element of R and then of R^{-1} .

Since $(4, 5) \in R$ and $(5, 4) \in R^{-1}$, we have $(4, 4) \in R^{-1} \circ R$

Similarly, $(1, 4) \in R$, $(4, 1) \in R^{-1} \Rightarrow (1, 1) \in R^{-1} \circ R$

$(4, 6) \in R$, $(6, 4) \in R^{-1} \Rightarrow (4, 4) \in R^{-1} \circ R$,

$(4, 6) \in R$, $(6, 7) \in R^{-1} \Rightarrow (4, 7) \in R^{-1} \circ R$

$(7, 6) \in R$, $(6, 4) \in R^{-1} \Rightarrow (7, 4) \in R^{-1} \circ R$,

$(7, 6) \in R$, $(6, 7) \in R^{-1} \Rightarrow (7, 7) \in R^{-1} \circ R$

$(3, 7) \in R$, $(7, 3) \in R^{-1} \Rightarrow (3, 3) \in R^{-1} \circ R$,

Hence, $R^{-1} \circ R = \{(1, 1); (4, 4); (4, 7); (7, 4), (7, 7); (3, 3)\}$.