Theorem: $(R^{-1})^{-1} = R$

Let R be a relation between two sets A and B.
Then, R^{-1} will be an inverse relation from B to A.

Required to prove (RTP):

1) $(R^{-1})^{-1} \subseteq R$
2) $R \subseteq (R^{-1})^{-1}$.

1) Let $(x,y) \in (R^{-1})^{-1}$.
Then, $(y,x) \in R^{-1}$
$\Rightarrow (x,y) \in R.$
$\therefore (R^{-1})^{-1} \subseteq R$

2) Let $(x,y) \in R$
Then, $(y,x) \in R^{-1}$
$\Rightarrow (x,y) \in (R^{-1})^{-1}$
$\therefore R \subseteq (R^{-1})^{-1}$.

$S = \{(x,y) \in N \times N \mid x+y=5\}$

RTP: S is symmetric.

Let $(x,y) \in S$.
Then, $x+y=5$
$\Rightarrow y+x=5$
$= (y,x) \in S$

$xSy \Rightarrow ySx, \quad \forall x,y \in N.$

$A = \phi, \qquad B = \{3,4\}$

$A \times B = \{(1,3), (1,$