EXERCISES ON RELATIONS

1. If $S = \{1,2,3\}$ and $T = \{3,4,5\}$, write out the pairs in the relation "within two of", i.e. $\forall [x,y] \in S \times T, x \text{ withinTwoOf } y \Leftrightarrow |x - y| \leq 2$.
2. If $S = \{3,4,5\}$ and $T = \{4,5,6\}$, write out the pairs in the relation "divides", i.e. $\forall [x,y] \in S \times T, x \text{ divides } y \Leftrightarrow y \bmod x = 0$.
3. If the inverse of a relation R is written R^{-1}, and is formed by reversing the pairs in the relation (i.e. $[y,x]$ instead of $[x,y]$) write out the pairs in the relation withinTwoOf^{-1} and divides^{-1}.
4. Transitivity of a relation R on some set A is defined by $\forall x,y,z \in A, [x,y] \in R \wedge [y,z] \in R \Rightarrow [x,z] \in R$. Is either withinTwoOf or divides transitive? Explain your answer.

ANSWERS