.. (*10 points*) Prove that if R is a symmetric, transitive relation on A and the domain of R is A, then R is eflexive on A.

If $(x,y) \in R$

And $x \in A \wedge y \in A$

Then $(y,x) \in R$ and $(x,x) \in R$ and $(y,y) \in R$

And $\forall \in A \; \exists y \in A \, [(x,y)] \in R$

$\therefore \forall x \in A \, [(x,x) \in R]$ & R is reflexive

12. (*10 points*) Suppose that R and S are equivalence relations on a set A. Prove that $R \cap S$ is an equivalence relation on A.

Let $a \in A$ be arbitrary

then $(a,a) \in R$ and $(a,a) \in S$ (R & S = reflexive)

$(a,a) \in R \cap S$

if $(a,b) \in A$ so $(a,b) \in R \cap S$. Then $(a,b) \in R$ & $(a,b) \in S$

$\therefore (b,a) \in R$ and $(b,a) \in S$ $\therefore (b,a) \in R \cap S$ & $R \cap S$ is symmetric

Let $(a,b,c) \in A$ and $(a,b)(b,c) \in R \cap S$ then $(a,b)(b,c) \in R$ and $(a,b)(b,c) \in S$.

R is transitive so $(a,c) \in R$
S is transitiv so $(a,c) \in S$] $(a,c) \in R \cap S$ = transitive

$\therefore$ $R \cap S$ is equivalence because its reflexive, symmetricc, & trans