

§8.5#56ab

(a) No! Let $R_1 = \Delta \cup \{(1, 2), (2, 1)\}$ and $R_2 = \Delta \cup \{(1, 3), (3, 1)\}$. Then both are TSR, but $R_1 \cup R_2$ is not transitive since $2(R_1 \cup R_2)1$ and $1(R_1 \cup R_2)3$, but the relation does not hold between 2 and 3

(b) Yes!

- Reflexive: Since both R_1 and R_2 are reflexive, $(a, a) \in R_i$ for each i and thus $(a, a) \in R_1 \cap R_2$
- Symmetric: If $a(R_1 \cap R_2)b$, then aR_1b and aR_2b by symmetry of each R_i , bR_1a and thus $(b, a) \in R_1 \cap R_2$
- Transitive: Same idea as symmetry: If aR_ib and bR_ic for both i 's, then aR_ic by transitivity of each R_i . Thus, $a(R_1 \cap R_2)c$