Prove or disprove: If R and S are antisymmetric, then $R \cup S$ is antisymmetric. We disprove the statement.

- 1. Let $T = \{a, b\}$, $R = \{(a, b)\}$, and $S = \{(b, a)\}$.
- 2. R and S are antisymmetric. (Defn. of antisymmetric)
- 3. $R \cup S = \{(a, b), (b, a)\}.$ (Defn. of \cup)
- 4. $\exists a, b, (a, b) \in R \cup S \land (b, a) \in R \cup S \land a \neq b$. (Step 3)
- 5. $R \cup S$ is not antisymmetric. (Step 4 and defn. of antysymmetric)