Prove that the following sentences are valid using a refutational approach: (i) convert the negated sentence to prenex form, (ii) eliminate existential quantifiers via Skolemization, and (iii) derive a contradiction from suitable instances of the Skolemized sentence.

1. \[ \forall x \exists y P(x, y) \rightarrow \neg \exists x \forall y \neg P(x, y) \]

2. The sentence \( \alpha_1 \land \alpha_2 \land \alpha_3 \rightarrow \beta \), where

   \( \alpha_1 \) is \( \forall x R(x, x) \),
   \( \alpha_2 \) is \( \forall x \forall y [R(x, y) \rightarrow R(y, x)] \),
   \( \alpha_3 \) is \( \forall x \forall y \forall z [R(x, y) \land R(y, z) \rightarrow R(x, z)] \),

   and

   \( \beta \) is \( \forall x \forall y \forall z [R(x, y) \land R(x, z) \rightarrow R(y, z)] \).

Note that this sentence essentially states that every equivalence relation is Euclidean.