Ground Resolution Algorithm

Goal: Determine whether \( \{\varphi_1, \ldots, \varphi_k\} \models \varphi \) holds

1. Let \( \xi \) be the formula \( \varphi_1 \land \ldots \land \varphi_k \land \neg \varphi \).

2. Transform \( \xi \) into Skolemnormal form \( \forall X_1, \ldots, X_n \psi \).

3. Transform \( \psi \) into CNF resp. into clause set \( \mathcal{K}(\psi) \).

4. Choose an enumeration \( \{K_1, K_2, \ldots\} \) of all ground instances of the clauses from \( \mathcal{K}(\psi) \).

5. Compute \( \text{Res}^*(\{K_1\}), \text{Res}^*(\{K_1, K_2\}), \text{Res}^*(\{K_1, K_2, K_3\}), \ldots \)

   If one of these sets contains \( \square \), stop and return "true".
Resolution for Predicate Logic

\[\{\{p(X), \neg q(X)\}, \neg p(f(Y)), \{q(f(a))\}\}\]

- use substitution \(\{X/f(Y)\}\) for resolution of the first two clauses

- \(p(X)[X/f(Y)] = p(f(Y))\) and \(\neg p(f(Y))[X/f(Y)] = \neg p(f(Y))\)

- \(\{X/f(Y)\}\) is most general unifier of \(\{p(X), p(f(Y))\}\)

- resolvent is \(\{\neg q(X)[X/f(Y)]\} = \{\neg q(f(Y))\}\)