

## CSCE420: Introduction to Artificial Intelligence

### First Order Logic Inference via Resolution

Start with the following three facts/axioms in your Knowledge Base:

1.  $\forall x, y \text{ Programmer}(x) \Rightarrow \text{Cordial}(x, y)$
2.  $\forall x, y \text{ Unsociable}(x) \vee \text{Unsociable}(y) \Rightarrow \neg \text{Cordial}(x, y)$
3.  $\exists x \text{ Programmer}(x) \wedge \text{Witty}(x)$

This question will have you prove that some things exist that are *witty* and are *sociable* by means of refutation.

**Step 1:** Express what is to be proved in First-Order Logic.

**Step 2:** Negate the preceding expression and simplify the result.

**Step 3:** The next step involves converting all expressions (axioms + result from previous step) to clause form. The result should be well-formed formula consisting of a universal prefix and quantifier-free conjunction of terms, each using only negation, conjunction, and disjunction. The answer has been partially completed below. Fill in the remaining elements.

**Universal prefix:** \_\_\_\_\_

**Axiom 1:** \_\_\_\_\_

**Axiom 2:** \_\_\_\_\_

**Axiom 3:** \_\_\_\_\_

**Step 2 Result:** \_\_\_\_\_

What is the process that produces Axiom 3? Why is it applicable?

**Step 4:** Resolve clauses, labelling the operations that occur, until an empty clause is produced which denotes contradiction.