Harvey Mudd College
Computer Science 80
Logic for Computer Science
Spring Semester 2001

Assignment #5 – Propositional Logic: Resolution Refutation and Matching

Due 11:00am, Wednesday March 7, 2001

1. Consider the set of numbered clauses:

$$a \vee \overset{1}{\neg b} \vee c \qquad b \vee \overset{2}{c} \vee \neg d \qquad b \vee \neg c \vee \overset{3}{e} \vee \neg f \qquad c \vee \overset{4}{d} \vee g$$

   For each pair of clauses show all possible resolvents of the pair.

2. Consider the set of assumptions:

   - Every fungus is either a mushroom or a toadstool.
   - Every boletus is a fungus.
   - Toadstools are poisonous, as are peach pits.
   - A boletus is not a mushroom.
   - This thing is a boletus.

   If we wish to know whether "this thing" is poisonous, we can model this with the set of formulas:

$$\Gamma = \{f \Rightarrow (m \vee t), b \Rightarrow f, (pp \vee t) \Rightarrow p, b \Rightarrow \neg m, b\}$$

   and attempt to prove the consequence:

$$\Gamma \models p$$

   Construct the corresponding implication, convert its negation to conjunctive normal form, and produce a resolution refutation tree showing that the consequence holds.

(over)

3. Consider the set of assumptions:

   - If the jar is heated, and the bug is in the jar, then the bug is dead.
   - The jar is heated.
   - The bug is in the jar.

   If we wish to know whether the bug is dead, we can model this with the set of formulas:

   $$\Gamma = \{hj \Rightarrow (bij \Rightarrow bd), hj, bij\}$$

   and attempt to prove the consequence:

   $$\Gamma \models bd$$

   Construct the corresponding implication, convert it (not it's negation) to CNF, and use the "simple" validity tester to show that the original consequence holds.