Assignment #5 – Propositional Logic: Resolution Refutation and Matching  
Due 11:00am, Wednesday March 7, 2001

1. Consider the set of numbered clauses:
\[ a \lor \neg b \lor c \quad b \lor c \lor \neg d \quad b \lor \neg c \lor e \lor \neg f \quad c \lor d \lor g \]

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:
\[ \Gamma = \{ f \Rightarrow (m \lor t), b \Rightarrow f, (pp \lor t) \Rightarrow p, b \Rightarrow \neg m, b \} \]

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.
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:

\[ \Gamma = \{ h_j \Rightarrow (b_i \Rightarrow b_d), h_j, b_i \} \]

and attempt to prove the consequence:

\[ \Gamma \models b_d \]

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