

**Problems for the group exercise session on  
April 7, 1998**

Note: There may not be time to do all of these exercises in the time allotted. If there is one which gives you particular difficulty, come prepared to ask about it.

1. Do exercise 5.2 on page 98 of the text.
2. Convert each of the formulas of Exercise 5.2 on page 98 of the text to DNF.
3. Do problems 1-3 on page 111 of the text. All resolution proofs should be refutation proofs. Also, try to find unit refutation and input refutation proofs, whenever possible.
4. For problem 3 on page 111, also provide solutions using the method of semantic tableaux.
5. Using resolution, prove that the following sets of clauses are unsatisfiable. To keep things manageable, delete superclauses as the resolution process proceeds.
  - (a)  $\{ P \vee \neg R, Q \vee \neg R, Q \vee \neg S, \neg P \vee T, \neg Q \vee \neg T, \neg Q \vee R \vee T, P \vee S \vee \neg T, \neg P \vee Q \vee R, Q \vee R \vee S \vee T \}$
  - (b)  $\{ P \vee \neg R, Q \vee \neg R, \neg P \vee S, \neg P \vee T, \neg Q \vee \neg T, \neg Q \vee R \vee T, P \vee R \vee \neg S, P \vee S \vee \neg T, R \vee \neg S \vee \neg T, Q \vee R \vee S \vee T \}$
6. Find the base of the set consisting of the following set of clauses, together with all of its resolvents.

$$\{ \neg A \vee B, \neg B \vee C, \neg C \vee \neg D, A \vee D, \neg A \vee B \vee C \}$$