

**Exercises for the group exercise session on
May 26, 1998**

Note: The final group exercise session is a "bonus," as the course normally has only five such sessions. Therefore, this session will be used primarily as a question-and-answer session for the entire course. So, if you have specific questions about previous exercises, bring them to this meeting. The following problems will also be considered.

1. Let

$$\Phi_1 := \{ (\forall x)(R(x) \vee P(x)), (\forall x)(\neg R(b) \vee P(x)), R(b) \vee (a=b) \}$$
$$\varphi_1 := P(a) \wedge P(b)$$

Prove that $\Phi_1 \models \varphi_1$ by converting this problem to an equivalent refutation problem, and then showing that the resulting set of clauses is unsatisfiable using resolution with paramodulation. Express your solution in the form of a proof graph, and include the substitutions which were used in the unifications, as well as the replacements used in any application of paramodulation. Remember that it is permissible to rename variables within distinct clauses.

2. Do Exercise 9.6 on page 200 of the textbook, as well as Exercise 9.8 on page 203.