TDBB08 Logic with Applications Spring 1998b

Obligatory Exercise 5
Due date: June 2, 1998 at 1500

Note: These exercises are to be turned in to Petter Edblom. Do not place them in the mail shelf of Stephen Hegner, or you will risk lateness penalties. All solutions of obligatory exercises must be completed individually. It is not permitted to copy, in whole or in part, the solutions of another and submit those solutions as one's own. Neither is it permitted to develop solutions within groups working together. Discussion of general course concepts is, of course, permitted.

1. Find a most general unifier for the following atoms, or else show that no such unifier exists.

   (a) $\{P(f(x_1,a), g(f(x_2,x_2)), x_4), P(f(g(y_1),y_2), g(y_3), a)$
   (b) $\{P(x_1, f(x_1,x_2), a), P(g(y_1), f(y_2,y_2), g(y_3))$

2. Using resolution, prove that $\Phi \models \varphi$, given the following.

   $\Phi := \{ (\forall x)(P(x) \vee Q(x)), (\forall x)(\exists y)(P(x) \rightarrow R(x,y)), (\forall x)(\exists y)(Q(x) \rightarrow S(x,y)) \}.$
   $\varphi := (\forall x)(\exists y)(R(x,y) \vee S(x,y)).$

3. Using resolution with paramodulation, prove that $\Phi \models \varphi$, given the following.

   $\Phi := \{ (\exists x)(P(x) \vee Q(x)), (\forall x)(P(x) \rightarrow (x=a)), (\forall x)(Q(x) \rightarrow (x=b)) \}.$
   $\varphi := P(a) \vee Q(b).$