
Exercise Sheet No 7

June 5, 2002

Deadline: June 12, 2002, before the lecture

1 bonus point

Exercise 7.1 (4 points)

Do the following expressions unify? If they do, specify the mgu and the resulting instance.

1. $Ancestor(x, y)$ and $Ancestor(Bill, father(Bill))$.
2. $Ancestor(x, father(x))$ and $Ancestor(David, George)$.
3. $P(f(y), w, g(z, y))$ and $P(x, x, g(z, A))$.
4. $F(x, g(f(a), u))$ and $F(g(u, v), x)$.

Exercise 7.2 (5 points)

Consider the following statements:

1. All who can read are literate.
2. Dolphins are not literate.
3. Some dolphins are intelligent.
4. Some who are intelligent cannot read.

Using only the predicates *Read*, *Literate*, *Dolphin*, *Intelligent*, represent these sentences in first-order predicate calculus. Convert these first-order predicate calculus sentences into clausal form. Use resolution to prove by contradiction that sentence (4) follows from sentences (1), (2) and (3). Indicate clearly the substitutions you make.

Exercise 7.3 (6 points)

Consider the following set KB of wff in predicate calculus:

$$\begin{aligned} &\forall x P(x) \vee \neg R(f(x)), \\ &\forall x \forall y R(f(x)) \vee R(f(f(y))) \end{aligned}$$

Prove by contradiction using resolution (in a graphical form) that

$$\forall x \exists y P(f(x)) \wedge R(y)$$

follows from KB . Indicate clearly the substitutions you make and the unifiers you use.

Exercise 7.4

(5 points)

Define the relation

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Reverse(list, reversed_list)
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in Prolog that reverses lists, e.g.

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Reverse(cons(A, cons(B, cons(C, cons(D, Nil))))),  
        cons(D, cons(C, cons(B, cons(A, Nil))))).
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(Hint: use Append as defined in the lecture.)