Logic Programming, Fall 2014
Tutorial 8: λProlog and Meta-predicates

For discussion during Week 10 (Nov. 17 – Nov. 21)

1. Describe how search in λProlog successfully solves the following propositional goals.
   (a) $a \Rightarrow (b \Rightarrow a)$
   (b) $(a \Rightarrow (b \Rightarrow c)) \Rightarrow ((a \Rightarrow b) \Rightarrow (a \Rightarrow c))$

2. Describe how search in λProlog successfully solves the goal sterile $j$ from McCarthy’s example in Theory Lecture 8 (pages 29-30).

3. There is a standard philosophical distinction between the use of a word in the normal way, and the mention of a word (when the word is talked about). Syntax of an object logic which is used in that language can be mentioned in a meta-language.
   Which words in the following are being used and which are mentioned?
   
   The artist formerly known as the artist formerly known as prince is now known as the artist.

4. The predicate var/1 checks the argument when called, and succeeds if the argument is a variable, otherwise it fails.
   Here are two calls at the sicstus top level, with no program loaded:
   
   $| ?- var(X), X=2.$
   X = 2 ?
   yes
   $| ?- X=2, var(X).$
   no
   
   Explain why this behaviour is incompatible with the declarative reading of Prolog programs.

5. Prolog can freely mix meta-predicates with standard predicates. Describe, as precisely as you can, the behaviour of the following program.
   
   flatten(X,[X]) :- var(X),!.
   flatten([],[]) :- !.
   flatten([H|T],L3) :-
     !,
     flatten(H,L1),
     flatten(T,L2),
     append(L1,L2,L3).
   flatten(X,[X]).

   Can you see a difference of use versus mention in this program?