COMP 356 Assignment 7: 32 Points

Due by 11:55 pm, Friday December 13 2019

Consider the following Prolog program:

parent(X, Y) :- mother(X, Y).

parent(X, Y) :- father(X, Y).

grandparent(X, Y) :- parent(X, Z), parent(Z, Y).

ancestor(X, Y) :- parent(X, Y). ancestor(X, Y) :- parent(Z, Y), ancestor(X, Z).

1. Extend the above program with rules defining the following relations:

(a) (5 pts) A relation fullSibling(X, Y) that determines whether two people are full siblings (have the same mother and father). Note: According to this definition, any given person is sibling to him or herself. Your relation definition should permit this possibility.

(b) (5 pts) A relation firstCousins(X, Y) that determines whether two people are first cousins. The first cousins of a person P are the children of P’s parents’ brothers and sisters. For this question, “brothers and sisters” means “brothers, sisters, half-brothers and half-sisters.” In other words, the definition is not restricted just to full siblings as in the previous part of this question. Important hint: you’ll need to use the built-in not-provable operator \+ here. For technical reasons, the \+ clause should be the last sub-goal in any rule where you use it. Otherwise, you will see unexpected results.

2. (5 pts) The following Prolog relation reverses a list:

isReverse([], []).

isReverse([A | X], Z) :- isReverse(X, Y), append(Y, [A], Z).

Use this relation to define a relation that determines whether a list is a palindrome (is the same when read from right to left as when read from left to right).

For example, if your relation is called palindrome, then the query:

palindrome([1,2,3,2,1]).

should succeed, while the query:

palindrome([1,2,3,1]). should return False.

3. (15 pts) Define a Prolog relation that finds the intersection of two sorted lists of numbers (in ascending order) – i.e. all elements that occur in both of the argument lists. That is, if your relation is called intersectS, then the query: intersectS([1, 2], [], Z).

should return:

Z=[]

and the query:

intersectS([1, 2, 3, 4], [2, 4, 6], Z).

should return:

Z=[2, 4].

4. [3 pts] Give the substitution needed to unify the following term:

[X, Y | Z] and [1, 2, 3, 4]

Your answer for this question should be placed as a comment in your Prolog source file. Prolog uses /\* ... \*/ style multi-line comments, and you should use the symbol -> express a binding in a substitution, e.g. {X -> 2, Y -> 3}.

Please submit your solutions as a single Prolog file names as <yourName>.pl