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Homework 4

1.

What would be the query for:

a. (10 points). Listing all of the men in the database?

b. (15 points). Listing all of the parents in the database?

a)
man(Man) or man(X)
- both of these return all men in the database

findall(X, man(X), Men)
- collects all “man” values in “X”, stores them in the list “Men”, and returns the list of men from database

b)
parent(Parent, Child)
- returns pairs of “Parent” with their “Child”
- this lists all the parents from the database and which children they are paired with

2.

Consider the following query:

a. ?- woman(X), parent(_, X).

What constraint does this query put on "X", i.e., what must "X" be, given this query? (10 points).

Consider the query:

b. ?- parent(Z,X), parent(Z,Y), X \= Y.

What relationship between "X" and "Y" does this query imply? (15 points).

Note that "\=" means "not equal to", i.e., "X is not equal to Y".

Note also that the queries of (a.) and (b.) will produce duplicates; that is okay.

a)
“X” is a daughter! They must be a woman/female and have any parent-child relationship in the database.

b)
“X” and “Y” are siblings! They both share the same parent “Z” but they are not the same person.

3.

a. Write an appropriately named rule in terms of "X" for the query (a.) of exercise 2. (10 points).

b. Write an appropriately named rule in terms of just "X" and "Y" for the query (b.) of exercise 2. (15 points).

A note on the meaning of "appropriately named rule" via an example: given some query "man(X), parent(X, _)", it would follow that "X" would have to be a "father", hence "father(X) :- man(X), parent(X, _)" would be an appropriately named rule in this case.

Note, again, that your rules (a.) and (b.) may produce duplicates; that is okay.

a)
daughter(X) :- woman(X), parent(_, X)

b)
siblings(X, Y) :- parent(Z, X), parent(Z, Y), X \= Y

4. (25 points).

Fill in the righthand side of a rule "grandson(X) :- ...", which is true if (and only if) "X" is a grandson (of someone, it doesn't matter who that someone is). Again do not worry if your rule produces duplicates, or generates a "Singleton variables:" warning, if you happen to run across this. You can use this rule in a query to find all grandsons in the above family tree to test if it is correct.

grandson(X) :-
man(X), parent(Y, X), parent(Z, Y), Z \= X

- the grandson is defined as a man/male “X” who has a parent “Y” and a grandparent “Z”
- “Z” is the parent of “Y” and “Y” is the parent of “X”
- “Z” and “X” are not the same person!