Name : Brijesh Rameshbhai Rohit

Admission number: U19CS009

PINCIPLES OF PROGRAMMING LANGUAGES

Assignment - 07

For the given family tree, do as directed using PROLOG:

- Write the predicates using the following relations:
  1. parent/2
  2. male/1
  3. female/1
  4. husband/2

```
%U19CS009
%BRIJESH ROHIT

%Taken from previous assignment
female(mary).
female(sandra).
female(juliet).
female(lisa).

male(peter).
male(paul).
male(dick).
male(bob).
male(harry).

parent(bob, lisa).
parent(bob, paul).
parent(bob, mary).
parent(juliet, lisa).
parent(juliet, paul).
parent(juliet, mary).
parent(peter, harry).
parent(lisa, harry).
parent(mary, dick).
parent(mary, sandra).

husband(peter,lisa).
husband(bob,juliet).
```

- Write the rules using above relations for the following:
  1. Child

```
%child(X child of Y).
child(X,Y):-
    parent(Y,X).
```

```
?- setof(X,Y^child(X,Y),B).
B = [dick, harry, lisa, mary, paul, sandra].

?- setof(X,Y^parent(X,dick),B).
B = [mary].

?- setof(X,Y^parent(X,harry),B).
B = [lisa, peter].

?- setof(X,Y^parent(X,lisa),B).
B = [bob, juliet].

?- setof(X,Y^parent(X,mary),B).
B = [bob, juliet].

?- setof(X,Y^parent(X,paul),B).
B = [bob, juliet].

?- setof(X,Y^parent(X,sandra),B).
B = [mary].
```

  2. Mother

```
% mother(X mother of Y).
mother(X,Y):-
    female(X),
    parent(X,Y).
```

```
?- setof(X,Y^mother(X,Y),B).
B = [juliet, lisa, mary].

?- setof(X,Y^child(X,juliet),B).
B = [lisa, mary, paul].

?- setof(X,Y^child(X,lisa),B).
B = [harry].

?- setof(X,Y^child(X,mary),B).
B = [dick, sandra].
```

  3. Father

```
% father (X father of Y).
father(X,Y):-
    parent(X,Y),
    male(X).
```

```
?- setof(X,Y^father(X,Y),B).
B = [bob, peter].

?- setof(X,Y^child(X,bob),B).
B = [lisa, mary, paul].

?- setof(X,Y^child(X,peter),B).
B = [harry].
```

  4. Wife

```
% wife (X wife of Y).
wife(X,Y):-
    female(X),
    husband(Y,X).
```

```
?- consult('u19cs009-assign07-q1.pl').
true.

?- setof(X,Y^wife(X,Y),B).
B = [juliet, lisa].

?- setof(X,Y^husband(X,juliet),B).
B = [bob].

?- setof(X,Y^husband(X,lisa),B).
B = [peter].
```

5. Son

```
% son (X son of Y).
son(X,Y):-
    male(X),
    child(X,Y).
```

```
?- setof(X,Y^son(X,Y),B).
B = [dick, harry, paul].

?- setof(X,Y^parent(X,dick),B).
B = [mary].

?- setof(X,Y^parent(X,harry),B).
B = [lisa, peter].

?- setof(X,Y^parent(X,paul),B).
B = [bob, juliet].
```

6. Daughter

```
% daughter (X daughter of Y).
daughter(X,Y):-
    female(X),
    child(X,Y).
```

```
?- setof(X,Y^daughter(X,Y),B).
B = [lisa, mary, sandra].

?- setof(X,Y^parent(X,lisa),B).
B = [bob, juliet].

?- setof(X,Y^parent(X,mary),B).
B = [bob, juliet].

?- setof(X,Y^parent(X,sandra),B).
B = [mary].
```

7. Brother

```
% brother (X brother of Y).
brother(X,Y):-
    son(X,Z),
    parent(Z,Y),
    X\==Y.
```

```
?- setof(X,Y^brother(X,Y),B).
B = [dick, paul].

?- setof(Y,Y^brother(dick,Y),B).
B = [sandra].

?- setof(Y,Y^brother(paul,Y),B).
B = [lisa, mary].
```

8. Sister

```
% sister (X sister of Y).
sister(X,Y):-
    daughter(X,Z),
    parent(Z,Y),
    X\==Y.
```

```
?- setof(X,Y^sister(X,Y),B).
B = [lisa, mary, sandra].

?- setof(Y,Y^sister(lisa,Y),B).
B = [mary, paul].

?- setof(Y,Y^sister(mary,Y),B).
B = [lisa, paul].

?- setof(Y,Y^sister(sandra,Y),B).
B = [dick].
```

9. Uncle

```
% uncle (X uncle of Y).
uncle(X,Y):-
    brother(X,Z),
    child(Y,Z).
```

```
?- setof(X,Y^uncle(X,Y),B).
B = [paul].

?- setof(Y,Y^uncle(paul,Y),B).
B = [dick, harry, sandra].
```

10. Aunt

```
% aunt (X aunt of Y).
aunt(X,Y):-
    sister(X,Z),
    child(Y,Z).
```

```
?- setof(X,Y^aunt(X,Y),B).
B = [lisa, mary].

?- setof(Y,Y^aunt(lisa,Y),B).
B = [dick, sandra].

?- setof(Y,Y^aunt(mary,Y),B).
B = [harry].
```

11. Nephew

```
% nephew (X nephew of Y).
nephew(X,Y):-
    male(X),
    uncle(Y,X);
    male(X),
    aunt(Y,X).
```

```
?- setof(X,Y^nephew(X,Y),B).
B = [dick, harry].

?- setof(Y,Y^nephew(dick,Y),B).
B = [lisa, paul].

?- setof(Y,Y^nephew(harry,Y),B).
B = [mary, paul].
```

12. Niece

```
% niece (X niece of Y).
niece(X,Y):-
    female(X),
    uncle(Y,X);
    female(X),
    aunt(Y,X).
```

```
?- setof(X,Y^niece(X,Y),B).
B = [sandra].

?- setof(Y,Y^niece(sandra,Y),B).
B = [lisa, paul].
```