Edit a file and enter the following database of facts. Save the file under the name “family.pl”

parent(abraham,homer).

parent(mona,homer).

parent(clancy,marge).

parent(jackie,marge).

parent(jackie,selma).

parent(jackie,patty).

parent(homer,bart).

parent(homer,lisa).

parent(marge,bart).

parent(marge,lisa).

A. Load “family.pl” and find the answer to the following questions:

(a) Is Abraham a parent of Bart?

parent(abraham,bart).

false

(b) Is Lisa a child of Mona?

parent(mona,lisa).

false

(c) Who are Bart’s parent?

parent(X,bart).

X=homer;

X=marge.

(d) Who are Homer’s children?

parent(homer,X).

X=bart;

X=lisa.

B. Add the following facts to the database using only the parent predicate:

(a) Maggie is the daughter of Homer and Marge.

parent(homer,maggie).

parent(marge,maggie).

(b) Selma is the parent of Ling.

parent(selma,ling).

C. Find the answer to the following queries:

(a) Who are the grandchildren of Abraham?

grandchildren(X,Y):-parent(X,some),parent(some,Y).

grandchildren(abraham,X).

X=bart;

X=lisa

(b) Who are the grandchildren of Clancy who have Marge as a parent?

grandchildrenparent(X,Y,some):-parent(X,some),parent(some,Y).

grandchildrenparent(clancy,X,marge).

X=bart;

X=lisa;

D. Augment the database with predicates to distinguish between male and female persons.

male(abraham).

male(homer).

male(bart).

female(clancy).

female(marge).

male(jackie).

female(selma).

female(lisa).

female(maggie).

female(patty).

female(mona).

female(ling).

E. Query the database to find out:

(a) Who are the male children of Marge?

parent(marge,X),male(X).

X = bart ;

(b) Who is Lisa’s father?

?- parent(X,lisa),male(X).

X = homer ;

(c) Who is Bart’s grandfather?

grandchildren(X,bart),male(X).

X=abraham;

X=clancy;

F. Augment the database with rules and predicate for the following relations:

1. mother

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

1. father

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

1. grandfather

grandfather(X,Y) :- parent(X,Anyone), parent(Anyone,Y),male(X).

1. grandmother

grandmother(X,Y) :- parent(X,Anyone), parent(Anyone,Y),female(X).

G. Add the different relation to your database, which is true if its two arguments are not the same, and is deﬁned as follows. Do not worry about the deﬁnition for now, it will be eventually taught.

different(X,X):-!,fail.

different(X,Y).

H. Now, augment the database with rules and predicates for the following relations:

1. sister(X,Y):-different(X,Y),parent(Z,X),parent(Z,Y),female(X).
2. brother(X,Y):-parent(Z,X),parent(Z,Y),male(X),different(X,Y).
3. aunt(X,Y):-parent(Z,Y),sister(X,Z),different(X,Y),female(X).
4. uncle(X,Y):-parent(Z,Y),sister(X,Z),different(X,Y),male(X).
5. cousin(X,Y):- aunt(Z,Y),parent(Z,X),different(X,Y).
6. siblings(X,Y):-parent(Z,X),parent(Z,Y),different(X,Y).