Prolog Programming Assignment

1) How does the queries in kb.pl file are executed?

→ Code:
```
loves(vincent, mia).
loves(marcellus, mia).
loves(pumpkin, honey-bunny).
loves(honey-bunny, pumpkin).

jealous(X, Y) :-
    loves(X, Z),
    loves(Y, Z).
```

query1: ?- loves(X, mia).
Output: X = vincent
X = Marcellus
Explanation: Here as we know vincent loves Mia as well as Marcellus loves mia. Thus the kb assumes that X is either vincent or Marcellus

query2: ?- jealous(X, Y).
output X = Y, Y = vincent
X = vincent
Y = Marcellus
X = Marcellus
Y = Y, Y = Marcellus
X = Y, Y = pumpkin
Y = Y, Y = Honey-bunny.

Explanation As there is no fixed parameters in our query.

The query will produce output of every jealous(x, y) pair on our prolog code. The jealous() rule follows
jealous(X, Y) :- loves(X, Z), loves(Y, Z).
Initially, x and y both were associated to vincent, ie, self association. It then follows reflexive property for the rest of the prolog code.

2) How does the queries in lists.pl file are executed?

→ code:
```
suffix(XS, YS) :-
    append(_, YS, XS).

prefix(XS, YS) :-
    append(YS, _, XS).

sublist(XS, YS) :-
    suffix(XS, ZS),
    prefix(ZS, YS).

nrev([], []).
nrev([H|T], L) :-
    nrev(T, T),
    append(T, [H], L)
```

query: ?- sublist([a,b,c,d,e], [c,d]).
output: True

Explanation: ~~In this query~~. A sublist procedure looks for a match between the first elements of the sub-list and the main-list ~~as~~. Here, [c,d] is the sub-list of the main list [a,b,c,d,e]. As the main list contains the sublist [c,d], the output is true. Else, the output would have been false.

Query 2: ?- suffix([a,b,c], zs)

Output: zs = [a,b,c]
zs = [b,c]
zs = [c]
zs = [ ]
false

Explanation. Suffix in general ~~elem~~ eliminates the front elements from a list. Here, by using suffix procedure, [a,b,c] elements are removed from a and continues until all the elements are removed. ~~As of the~~ As there are no more elements in the list, the output will be ~~displa~~ displayed as false

Q3 Programming create a Prolog code to find factorial of a number?

→ code: factorial(0,1).
factorial(N,F) :-

N > 0,
N1 is N-1,
factorial (N1, F1),
N is N * F1.

Query: ?- factorial (3, W).

Output: W = 6

~~Explanation~~

Q4. In examples data set movies.pl write query strings and results of query execution for any of 5 tasks:

a) In which year was the movie American Beauty released?

Query: ?- movie (american_beauty, Y).

Output. Y = 1999.

b) Find the movies released in year 2000.

Query: ?- movie(M, 2000).

Output: M = down_from_the_mountain
M = O_brother_where_art_thou
M = ghost_world

c) Find movies released before 2000

query : ? - movie (M, Y) , Y < 2000

output : M = american_beauty
Y = 1999

M = anna
Y = 1987

M = barton_fink
Y = 1991

d) Find the movies released after 1990

query : ?- movie (M, Y) Y > 1990.

output M = american_beauty
Y = 1999

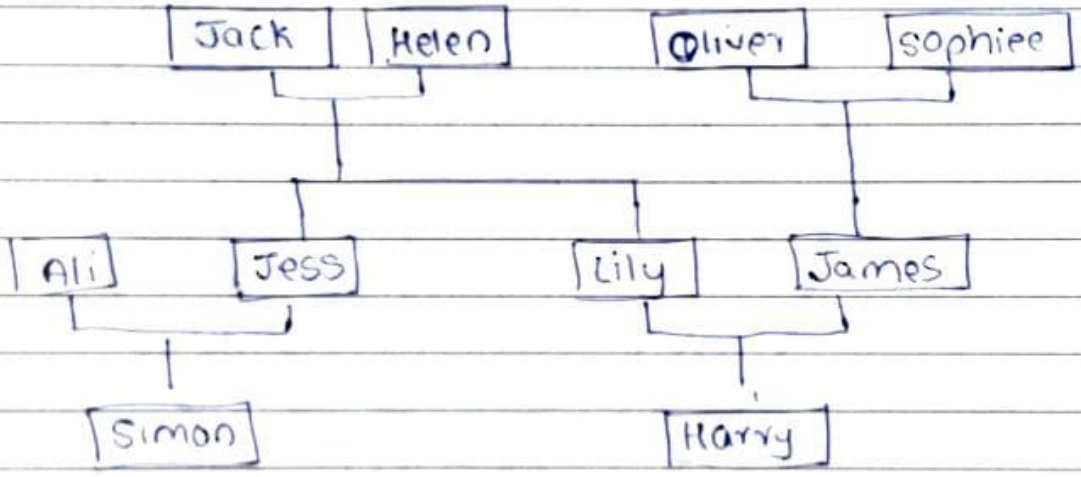
M = barton_fink
Y = 1991

e) Find a director of a movie in which Scalett Johansson appeared.

query : ?- actress (M ; Scarlett_Johansson) _), director (M, D)
output : D = peter_webber,
M = girl_with_a_pearl_earring.

Q5. Draw a family tree of you/any arbitrary family. which has the following relations mother, father, daughter, son, grandson, grandmother, sibling, uncle, person, male, female. You need to convert it into KB and write atleast 6 queries and query results on your KB.

→ ~~Query~~ Diagram:



Family Tree

Query 1: ?-mother_of (x, jess).

output: X = helen

Query 2: ? parent_of (x, simon).

output: x = jess

Query 3 : ?- sister_of (x, lily).

Output : x - jess

Query 4 : ?- parent_of (x, harry).

Output : X = lily
X = james

Query 5 : ?- aunt_of (x, simon).

Output : X = lily

Query 6 : ? grandfather_of (x, harry).

Output : X = jack