Prolog programming Assignment

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

A) Code:

```
loves (vincent, mia).
loves (marcellus, mia).
loves (Pumpkin, honey-bunny)
loves (honey-bunny, Pumpkin)

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

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

query 2: ? - jealous (X, Y)
Output
X = X, X - vincent
X = vincent
Y = marcellus
X = marcellus
X = X, Y - marcellus
X = Y, Y - Pumpkin
X = Y, Y = Honey-bunny

Explanation: As there is no fixed parameter

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 were associated to vincent, i.e. self association will then follow reflexive property for the rest of the prolog code.

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

A) 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, T1),
    append(T1, [H], L).
```

query1: ?- sublist([a,b,c,d,e], [c,d])
output: True

Explanation: A sublist procedure looks for a match between the first elements of the sublist and the main list. 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 eliminates the front elements from a list then, by using suffix procedure. [a,b,c] elements are removed from a and continues until all the elements are removed, as there are no more elements in this list, the output will be displayed as 'false'.

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

A) Code: factorial(0,1):
factorial(N,f):-

N>0,
N1 is N-1
factorial(N1,f1),
N is N * F1,

Query 2 - factorial(3,W).

Output: W=6

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 : $\{ m \mid movie(m, y), y > 1990 \}$

output: m = american-beauty
y = 1999

m = barton-fink
y = 1991

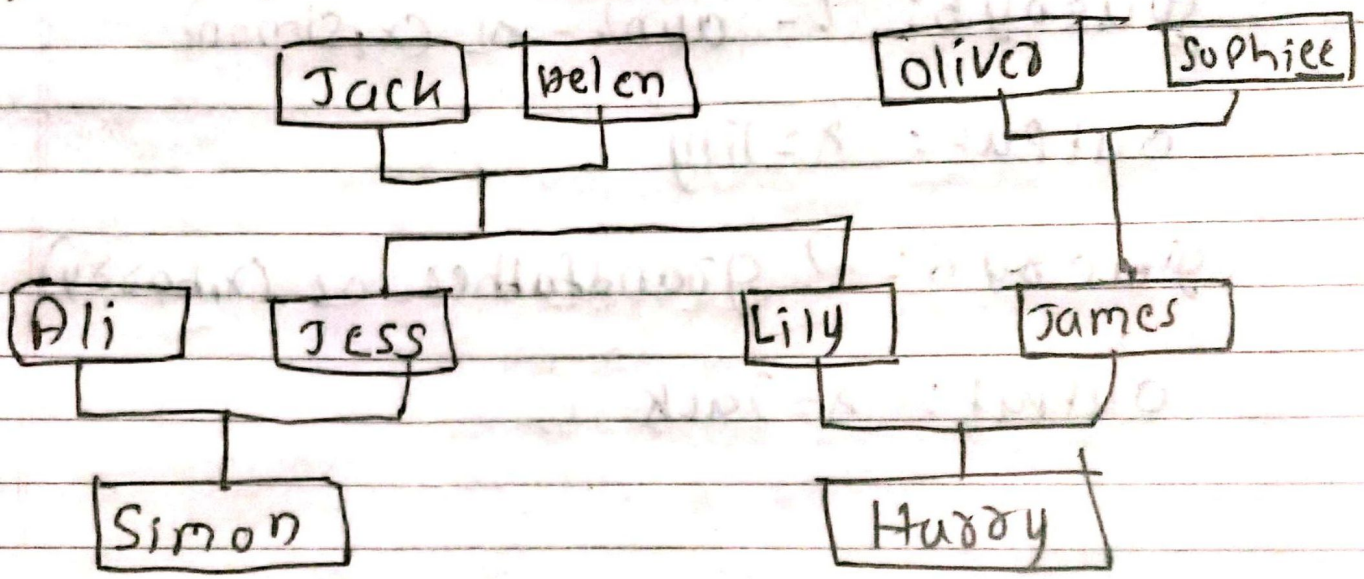
e) Find a director of a movie in which Scarlett Johansson appeared

query: $\{ d \mid actress(m, \text{Scarlett-Johansson}), director(m, d) \}$

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.

A) 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