COMP 3005
Assignment #3
Due: October 19

Instruction

1. You should do the assignments independently. Copying is not allowed.
2. Submit your assignment as a single word/PDF document on culearn.

Part 1 Concepts (20 marks)

Explain the following terms as complete as possible. Simply give full name is not acceptable. Each question is 2 marks.

1. Mini World:
   part of the real world for which the database system is developed with its data stored in the database.
2. Data Model
   Specifies how data is structured and operated.
3. Database System
   The database and the applications developed for the users on top of DBMS
4. Domain
   Consist of a name, and a set of atomic values, may also have a data-type/format
5. Relational Model
   Data is represented in terms of tuples (records), grouped into relations (files).
6. Attribute
   a column name of the relation indicating the meaning of the data items in that column.
7. Relation
   A scheme with a relation name and a set of attributes, and an instance that is a set of tuples.
8. Primary Key
   A chosen key that has minimum set of attributes uniquely identifying tuples in a relation.
9. Logical Data Independence
   The capacity to change the conceptual schema without having to change the external schemas and their associated application programs
10. SQL
    Standard database language for data definition, data manipulation and data querying.

Part 2 Queries (70 marks)

Given the **Person-Hobby** database shown below. Use Domain Relational Calculus (DRC) to expression the following queries. Submit your query expressions. Each query is 5 marks. You should use one DRC query *when possible* and use more than one in this case will not get any mark.

Person

P#	Name	Age
P1	Smith	20
P2	Jones	30
P3	Blake	25
P4	*Lastname*	20
P5	Adams	30

Hobby

H#	Name
H1	Bowling
H2	Chess
H3	Dancing
H4	Hiking
H5	Skating
H6	Ski

Play

P#	H#	Times
P1	H1	3
P1	H2	2
P1	H3	4
P1	H4	2
P1	H5	1
P1	H6	1
P2	H1	3
P2	H2	4
P2	H3	5
P2	H4	2
P3	H2	2
P3	H3	3
P4	H2	3
P4	H3	4

1. Get the names of hobbies that "*lastname*" plays.
   {N | (exists P,H)(Person(P, 'Lastname', _) and Play(P,H,_) and Hobby(H,N))};
2. Get the names of persons who play Bowling.
   {N | (exists P,H)(Person(P, N, _) and Play(P,H,_) and Hobby(H, 'Bowling'))};
3. Get the names of persons who play a hobby more than 3 times.
   {N | (exists P,T)(Person(P, N, _) and Play(P,_,T) and T > 3)};
4. Get the names of persons who play either chess or dancing.
   {N | (exists P,H)(Person(P, N, _) and Play(P,H,_) and (Hobby(H, 'Chess',_) or Hobby(H, 'Dancing')))};
5. Get the names of persons who play both chess and dancing.
   {N | (exists P,H1,H2)(Person(P, N, _) and Play(P,H1,_) and Hobby(H1, 'Chess',_) and Play(P,H2,_)
   and Hobby(H2, 'Dancing',_))};
6. Get the person name/hobby name pairs such that the indicated person plays the indicated hobby.
   {PN,HN | (exists P,H)(Person(P, PN, _) and Hobby(H,HN) and Play(P, H, _))};
7. Get the names of persons who do not play Ski.
   {N | (exists P)(Person(P, N, _) and not(exists H)(Play(P,H,_) and Hobby(H, 'Ski'_)))};
8. Get the names of persons who do not play any hobby.
   {N | (exists P)(Person(P, N, _) and not (exists H)(Play(P,H,_)))};
9. Get the names of persons who play all hobbies.
   {N | (exists P,H)(Person(P, N, _) and (forall H)(not Hobby(H, _) or Play(P,H,_)))};
10. Get the names of persons who play all hobbies that "*lastname*" plays.
    {N | (exists P',P)(Person(P', N, _) and person(P, 'Lastname' ,_) and
    (forall H)(not (Hobby(H,_) and Play(P,H,_) or Play(P',H_))))};
11. Get the names of persons who play only all the hobbies that "*lastname*" plays.
    {N | (exists P',P)(Person(P', N, _) and person(P, 'Lastname' ,_) and
    (forall H)(not (Hobby(H,_) and Play(P,H,_) or Play(P',H_)) or
    not (Hobby(H,_) and not Play(P,H,_)) or not Play(P',H,_)))};
12. Get the names of persons who play all hobbies except Skating and Ski.
    {N | (exists P)(Person(P, PN, _) and
    (forall H) (not (exist N)(Hobby(H,N) and N != 'Skating' and N != 'Ski') or Play(P,H,_)) or
    not (exist N)(Hobby(H,N) and (N = 'Skating' or N = 'Ski') or not Play(P,H,_)))};

13. Get the names of persons who play hobbies, the number of hobbies and total number of times they play those hobbies.
    {N, count(H), sum(T) | (exists P)(Person(P, N, _) and Play(P,H,T))};
14. Get the names of persons who play hobbies but play the least number of hobbies.
    T : = {N, sum(T) | (exists P,H,T)(Person(P, N, _) and Play(P,H,T));
    {N | (exist C)(T(N,C) and min(C));