CS 178: Homework 3. Due Feb.11th, 12noon.

Ques.1: In this question repeat Question 2 of Homework 2. Provide SQL code for the queries in Question 2, Homework 2.

Easy solution: translate directly from the Relational algebra queries from Homework 2.

```
SELECT *
FROM Location
WHERE MainAttraction = 'Beach';

SELECT Place,Name
FROM Visited
WHERE Year < 2000;

SELECT Name
FROM Visited, Person
WHERE Visited.ID=Person.ID AND Year=2003;

SELECT P1.name, P2.name
FROM  Person P1,P2, Visited V1,V2
WHERE P1.ID not= P2.ID AND V1.ID=P1.ID AND V2.ID=P2.ID AND
      V1.Country=V2.Country AND V1.year=V2.year;
```

For the last query, find for each person all the places they visited. This set must be superset (or equal to) the set of all locations.

```
SELECT P1.name
FROM Person P1, Visited V1, Locations L1
WHERE
      (SELECT V1.PlaceName      /*this gives set of all places visited by person P1 */
       FROM Visited V1
       WHERE V1.ID= P1.ID)
      CONTAINS                  /*set of all places */
      (SELECT L1.PlaceName
       FROM Location L1);
```

Ques.2: In this question, provide SQL queries for the queries in Question 4 of Homework 2.

```
SELECT  Name, Street, City
FROM EMP, DEPT
WHERE DNO = DNUM AND DNAME='Research';
```

```
SELECT P.Pnum, D.DNUM, E.NAME,
FROM PROJECT P, DEPT D, EMP E
WHERE P.PLocation='Stafford' AND P.DNO=D.DNUM AND D.MGRSSN=E.SSN;


SELECT E1.Name, E2.Name
FROM EMP E1, EMP E2
WHERE E1.SuperSSN = E2.SSN;
```

Ques.3: For the COMPANY database in Homework 2, and shown below with additional table (called DEPENDENTS), provide SQL queries for the following:

- List all project numbers associated with Smith, either as manager of a controlling department or as an employee working on the project.

```
(SELECT PNO
FROM  WORKS-ON, EMP
WHERE ESSN=SSN AND Name= 'Smith')
UNION
(SELECT PNO
 FROM DEPT, PROJECTS,EMP
  WHERE MGRSSN=SSN AND Name='Smith' AND
DEPT.DNUM=PROJECTS.DNO);
```

- Find names of employees who work on the same project that Smith works on.

```
SELECT E1.Name
FROM EMP E1, WORKS-ON W1
WHERE E1.SSN = W1.ESSN AND W1.PNO  IN
                                        (SELECT W2.PNO
                                          FROM EMP E2, WORKS-ON W2
                                          WHERE E2.Name= 'Smith' AND
                                           E2.SSN = W2.ESSN);
```

- Find names of employees who have no dependents.

```
SELECT E1.Name
FROM EMP E
WHERE not exists
            (SELECT *
              FROM DEPENDENTS D
              WHERE E.SSN=D.ESSN);
```

- Find names of employees with at least two dependents.

```
SELECT E.Name
FROM EMP E
WHERE (
```

```
SELECT count(*)
FROM DEPENDENT D
WHERE E.SSN=D.ESSN) >= 2;
```

- Find departments with at least 10 employees. The solution is written for the case when we want to find the name of the department; if only the number is desired then there is no need for the join between EMP and DEPT.

```
SELECT D.DNUM, D.DName
FROM DEPT D, EMP E
WHERE E.DNO= D.DNUM
GROUPBY D.DNUM
HAVING (count(*) ) >=10;
```

- Find average salary and department names, for each department (the average salary of a department is the average of all salaries of employees assigned to a department).

```
SELECT DNAME, avg(Salary)
FROM DEPT D, EMP E
WHERE E.DNO = D.DNUM
GROUPBY D.DNUM;
```

- Find the department number and name of the department with the largest average salary (of its employees).

```
SELECT DNUM, DNAME
FROM DEPT D, EMP E
WHERE D.DNUM=E.DNO
GROUPBY D.DNUM
HAVING avg(Salary) >=ALL
                    (SELECT avg(Salary)
                     FROM DEPT X, EMP Y
                     WHERE X.DNUM=Y.DNO
                     GROUPBY DNUM):
```

- Give a 50% pay-cut to the employee with the highest salary.

```
UPDATE EMP E
SET E.Salary = 0.5*E.Salary
WHERE E.Salary >=ALL
            (SELECT X.Salary
             FROM EMP X);
```

```
CREATE TABLE EMP (
     SSN int PRIMARY KEY,
     Name Varchar(50),
     Birthdate Date,
     Street Varchar(50),
     City Varchar(50),
     DNO int,
     SuperSSN int,
     Salary Real,
     FOREIGN KEY (DNO) REFERENCES DEPT(DNUM),
     FOREIGN KEY (SuperSSN) REFERENCES EMP(SSN));


CREATE TABLE DEPT (
     DNUM int PRIMARY KEY,
     DNAME Varchar(50),
     MGRSSN int,
     UNIQUE DNAME,
     FOREIGN KEY (MGRSSN) REFERENCES EMP(SSN));

CREATE TABLE PROJECTS(
     PNum int PRIMARY KEY,
     Pname Varchar(50),
     Plocation Varchar(50),
     DNO int,
     FOREIGN KEY (DNO) REFERENCES DEPT(DNUM));

CREATE TABLE WORKS(
     ESSN int,
     PNO int,
     HOURS int,
     PRIMARY KEY (ESSN,PNO),
     FOREIGN KEY (ESSN) REFERENCES EMP(SSN),
     FOREIGN KEY (PNO) REFERENCES PROJECTS(PNUM));

CREATE TABLE DEPENDENT(
     ESSN int  NOT NULL,
     DEPNAME Varchar(50) NOT NULL,
     SEX  char,
     BDATE     Date,
     RELATIONSHIP Varchar(10),
     PRIMARY KEY (ESSN,DEPNAME),
     FOREIGN KEY (ESSN) REFERENCES EMPLOYEE(SSN));
```