CS 34800 Homework 3

1) Consider the following relational schema; the schema describes a database containing data about theses carried out by students of a master degree. Theses have supervisors and co-supervisors. The underlined attributes denote the primary keys of the relations. The column Prof# in the relation Theses indicates the professors that are supervisors.

   Students (<u>S#</u>, FName, LName, Street, City, Phone#)
   Theses (<u>T#</u>, Title, Topic, Prof#, S#, Evaluation)
   Professors (<u>Prof#</u>, PName, Rank, Phone#, Dept#)
   Theses-Co-Supervisors (<u>T#</u>, <u>Prof#</u>)

   (a) (10 points) Determine which is the correct query for retrieving the number of theses supervised by Professor Brown (assume that there is only one professor with last name equal to 'Brown'):

   (i)   SELECT Count(*) FROM Theses, Professors WHERE
           Theses.Prof# = Professors.Prof# AND PName='Brown';

   (ii)   SELECT Count (DISTINCT Topic) FROM Theses, Professors WHERE
           Theses.Prof# = Professors.Prof# AND PName='Brown';

   (iii)   SELECT Sum (T#) FROM Theses, Professors WHERE
           Theses.Prof# = Professors.Prof# AND PName='Brown';

   (iv)   None of the above

   (b) (10 points) Assume that there are several professors with last name equal to 'Brown'. Determine which is the SQL query that retrieves the Prof# of these professors and for each Prof# the number of theses supervised by the professor with this number.

   (i)   SELECT Prof#, Count(*) AS NUM_THESES FROM Theses, Professors WHERE
           Theses.Prof# = Professors.Prof# AND PName='Brown';

   (ii)   SELECT Prof#,Count(*) AS NUM_THESES FROM Theses GROUP BY Prof#
           HAVING Prof# IN (SELECT Prof# FROM Professors WHERE Pname='Brown');

   (iii)   SELECT Prof#,Count (DISTINCT *) AS NUM_THESES FROM Theses, Professors
           WHERE Theses.Prof# = Professors.Prof# AND PName='Brown';

   (iv)   None of the above

(c) (10 points) Determine which is the correct query for retrieving the Prof# of the professors who supervise the maximum number of theses:

(i)   SELECT Prof# FROM Theses GROUP BY T# HAVING COUNT (*) $\geq$
          (SELECT COUNT (*) FROM Theses GROUP BY Prof#);

(ii)   SELECT Prof# FROM Theses GROUP BY Prof# HAVING COUNT (*) $\geq$
          (SELECT COUNT (*) FROM Theses GROUP BY Prof#);

(iii)   SELECT Prof# FROM Theses GROUP BY Prof# HAVING COUNT (*) $\geq$ ALL
          (SELECT COUNT (*) FROM Theses GROUP BY Prof#);

(iv)   None of the above.

(d) (10 points) Determine which is the correct query for retrieving the names of the professors who co-supervise at least two theses:

(i)   SELECT PName FROM Professors WHERE Prof# IN
          (SELECT Prof# FROM Theses-Co-Supervisors GROUP BY T#);

(ii)   SELECT PName FROM Professors WHERE Prof# IN
          (SELECT Prof# FROM Theses-Co-Supervisors GROUP BY Prof# HAVING
          COUNT (*) $\geq$ 2);

(iii)   SELECT PName FROM Professors WHERE Prof# =
          (SELECT Prof# FROM Theses-Co-Supervisors GROUP BY Prof# HAVING
          COUNT (*) $\geq$ 2);

(iv)   None of the above.

(e) (10 points) Determine which is the correct update operation that assigns as supervisor of the thesis by student Bob Smith the same supervisor of the thesis by student Mary Rossi (assume that there is a single student with name Bob Smith and a single student with name Mary Rossi):

(i)   UPDATE Theses X, Theses Y SET X.Prof# = Y.Prof#
        WHERE X.FName = 'Bob' AND X.LName = 'Smith' AND
        Y. FName = 'Mary' AND Y.LName = 'Rossi';

(ii)   UPDATE Theses SET Prof# =
          (SELECT Prof# FROM Students, Theses WHERE
          Students.S# = Theses.S# AND FName = 'Bob' AND LName = 'Smith')
          WHERE S# = (SELECT S# FROM Students WHERE
          FName = 'Mary' AND LName = 'Rossi');

(iii)   UPDATE Theses SET Prof# =
          (SELECT Prof# FROM Students, Theses WHERE
          Students.S# = Theses.S# AND FName = 'Mary' AND LName = 'Rossi')
          WHERE S# = (SELECT S# FROM Students WHERE
          FName = 'Bob' AND LName = 'Smith');

(iv)   None of the above.

2) Consider the following view definition
   CREATE VIEW V3 AS SELECT * FROM Theses WHERE Topic ='DB'
       WITH CHECK OPTION;

   (a) (5 points) Would the following INSERT statement be executed? Answer YES or NO.
       INSERT INTO V3 VALUES (230, 'Secure OS', 'Security', 200, 1300, 'A')

   (b) (5 points) Would the following INSERT statement be executed? Answer YES or NO.
       INSERT INTO V3 VALUES (230, 'Object DBMS', 'DB', 200, 1300, 'A')

3) Consider the table **Tab1** below and assume that the following constraint is defined on this
   table: CHECK (B+C < 1000)
   Tab1

A	B	C
10	500	100
20	700	100
30	500	300
40	600	300

   (a) (10 points) Suppose that the following update is executed on table **Tab1**
   UPDATE Tab1 SET B=B+150;
   Which of the following represent the content of Tab1 after the update?
   1.

A	B	C
10	650	100
20	850	100
30	650	300
40	750	300

   2.

A	B	C
10	650	100
20	850	100
30	650	300
40	600	300

   3.

A	B	C
10	500	100
20	700	100
30	500	300
40	600	300

   4. None of the above

(b) (10 points) Suppose that the following update is executed on table **Tab1**

UPDATE Tab1 SET B=B+50;

Which of the following represent the content of Tab1 after the update?

1.

A	B	C
10	550	100
20	750	100
30	550	300
40	650	300

2.

A	B	C
10	550	100
20	750	100
30	550	300
40	600	300

3.

A	B	C
10	500	100
20	700	100
30	500	300
40	600	300

4. None of the above

4) Consider the following schema:

Sailors(sid,sname,rating,age)
Boats(bid,bname,color)
Reserves(sid,bid,day)

These tables are created using the following CREATE TABLE statements

CREATE TABLE Sailors (sid INT DEFAULT 1, sname VARCHAR(15), rating INT, age INT, PRIMARY KEY(sid));

CREATE TABLE Boats(bid INT DEFAULT 2, bname VARCHAR(15), color VARCHAR(10), PRIMARY KEY(bid));

CREATE TABLE Reserves (sid INT, bid INT, day DATE, PRIMARY KEY(sid,bid), FOREIGN KEY(sid) REFERENCES Sailors ON DELETE CASCADE, FOREIGN KEY(bid) REFERENCES Boats ON UPDATE SET DEFAULT);

Consider the query 'Find the names of the sailors who have reserved all the boats'.
Consider the following SQL statements

a)   SELECT S.sname FROM Sailors S WHERE NOT EXISTS (
           (SELECT B.bid FROM Boats B)
           EXCEPT
           (SELECT R.bid FROM Reserves R WHERE R.sid = S.sid))

b)   SELECT S.sname FROM Sailors S WHERE NOT EXISTS
        (SELECT B.bid FROM Boats B WHERE NOT EXISTS
           (SELECT R.bid FROM Reserves R WHERE R.bid = B.bid AND R.sid = S.sid)
)

c)   SELECT S.sname FROM Sailors S WHERE NOT EXISTS (
           (SELECT B.bid FROM Boats B)
           INTERSECT
           (SELECT R.bid FROM Reserves R WHERE R.sid = S.sid))

(10 points) Which of the following SQL statements correspond to the above query?

1.   both a and b
2.   both a and c
3.   both b and c
4.   none of the above

5) Consider the following state of the database given in question 4 after few insertions.

Sailors

sid	sname	rating	age
22	Dustin	7	40
32	Andy	9	25
44	Bob	3	30

Reserves

sid	bid	day
22	101	10/10/00
22	102	10/10/01
32	104	09/29/03
32	102	08/22/10
32	101	09/25/11

Boats

bid	bname	color
101	Interlake	blue
102	Interlake	red
103	Clipper	green
104	Marine	red

Consider following query "List all sname of sailors and the bid of the boats they reserved. All the snames should be displayed irrespective of whether or not they have made a reservation"

Consider the following SQL statements:

a)   SELECT sname, bid FROM (Sailors LEFT OUTER JOIN Reserves ON Sailors.sid = Reserves.sid);

b)   SELECT sname, bid FROM (Reserves NATURAL JOIN Sailors);

c)   SELECT sname, bid FROM (Reserves RIGHT OUTER JOIN Sailors ON Sailors.sid = Reserves.sid);

(10 points) Which of the following SQL statements correspond to the above query?

1.   both a and b
2.   both a and c
3.   both b and c
4.   none of the above