CMPS 180, Midterm Exam, Fall 2016, Shel Finkelstein

Student Name: _____

Student ID: _____

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Midterm Points

Part	Max Points	Points
I	30	
II	25	
III	27	
IV	20	
Total	102	

Please show your **UCSC ID** when you turn in your exam.

Part I: (30 points, 6 each):

Question 1: Assume that R is a relation that has 5 tuples in it, S is a relation that has 4 tuples in it, and T is a relation that has 3 tuples in it. How many tuples are there in the result of the following SQL query?

SELECT *
FROM R, S, T;

Answer 1: _____

Question 2: Let R(A,B,C,D) be a relation, where attributes C and D can't be NULL, and where (A, B) is the primary key for that relation. Assume that A's domain has 10 different values, B's domain has 5 different values, C's domain has 4 different values, and D's domain has 3 different values. What is the maximum number of different tuples that can be in R?

Answer 2: _____

Question 3:   For the relation StarsIn(movieTitle, movieYear, starName), where movieTitle and starName are character, movieYear is integer, and(movieTitle, movieYear) is the primary key, write a SQL query that finds all the different titles of movies starring Harrison Ford.

Answer 3:

Question 4: What are **two major advantages** of using transactions, rather than just executing SQL statements one at a time? Explain your two answers briefly.

Answer 4:

Question 5: SQL uses 3-valued logic, with TRUE, FALSE and UNKNOWN.

Rows don't appear in a query result if the value of the WHERE clause condition is FALSE, and they also don't appear in the result if the value of the WHERE clause is UNKNOWN. Perhaps UNKNOWN could be eliminated from SQL, replaced by FALSE? Nope. Explain why eliminating UNKNOWN that way would change SQL semantics.

Answer 5:

Part II: (25 points, 5 each)

The following questions concern a table that was created by the statement:

```
CREATE TABLE Students (
        student_id          INTEGER PRIMARY KEY,
        name                VARCHAR(20) ,
        address             VARCHAR(30),
        age                 INTEGER,
        major               CHAR(4) NOT NULL DEFAULT ('CMPS'),
        UNIQUE (name, address)
        );
```

Answer each question in this Part of the Midterm with **TRUE** or **FALSE**.

Question 6: major can never have the value NULL, but any other attribute could be NULL.

Answer 6: _____

Question 7: The answers to the following 3 queries might <u>all be different</u>.

```
SELECT COUNT(*)
FROM Students;

SELECT COUNT(name)
FROM Students;

SELECT COUNT(DISTINCT name)
FROM Students;
```

Answer 7: _____

Question 8: The following is a legal SQL query.

```
SELECT MAX(age) - MIN(age), major
FROM Students
WHERE age > 18
GROUP BY major;
```


Answer 8: _____

Question 9: If there are no tuples in Students, and you execute the statement:

INSERT INTO Students(student_id, name, age)
  VALUES (12345, 'John Smith', 21);

then after executing that INSERT statement, there will be one row in Students, with student_id 12345, name 'John Smith', address NULL, age 21, and major 'CMPS'.

Answer 9: _____

Question 10:

If (98765, 'Eliza Doolittle', 'Higgins Place', 21, 'ENGL') is a tuple in the Students table, and the following is executed, with no other work going on:

BEGIN TRANSACTION;

UPDATE Students
SET age = age + 1
WHERE name = 'Eliza Doolittle';

UPDATE Students
SET major = 'CMPS'
WHERE age = 22;

ROLLBACK;

then afterwards, for the tuple with student_id 98765, the age will be 22 and the major will be 'CMPS'.

Answer 10: _____

Part III: (27 points, 9 each):

Questions 11-13 are about the instances of the tables Customers, Slopes and Activities on the sheet at the back of the test.

Show attribute names at the top for all SQL results.

Question 11: What is the result of the following SQL query?

SELECT a.day
FROM Slopes s, Activities a
WHERE s.color = **'Blue'**
AND s.slope_id = a.slope_id;

Answer 11:

Question 12: What is the result of the following SQL query?

```
SELECT DISTINCT c.cname
FROM Customers c
WHERE c.age <= ALL ( SELECT c2.age
                     FROM Customers c2
                     WHERE c.type = c2.type
                     AND c2.level = 'Advanced' )
ORDER BY c.cname;
```

Answer 12:

Question 13: What is the result of the following SQL query?

SELECT c.cname, s.sname, COUNT(a.day),
FROM Activities a, Customers c, Slopes s
WHERE a.cid = c.cid
AND a.slope-id = s.slope-id
GROUP BY c.cname, s.sname;

Answer 13:

Part IV: (10 points, 10 each):

Question 14-15 are also about the relations Customers, Activities and Slopes that appear at the end of the test. For these questions, you should write SQL queries that are correct for <u>any instances</u> of the relations, not just for the data shown.

(If you want to create and then use views to answer these questions, that's okay, but it's not required.)

Question 14: Write a SQL query that determines the total number of activities that each customer did. (A customer did an activity if there's a row with that customer's cid in the Activities table.)

Your result should show the customer's cid and cname, and the activity count. But don't include any customers who engaged in no activities.

Answer 14:

Question 15: Write a SQL query whose result is the name of Slopes where at least two <u>different</u> customers did Activities on that slope. Only the name of the slope should appear, and no slope name should appear more than once.

Answer 15:

For Parts III-IV (Questions 11-15), here are the relations Customers, Activities and Slopes that describe customer participation in winter activities on slopes.

cid is the primary key for Customers, slope-id is the primary key for Slopes, and (cid, slope-id, day) is the primary key for Activities.

Customers

cid	cname	level	type	age
36	Cho	Beginner	snowboard	18
34	Luke	Inter	snowboard	25
87	Ice	Advanced	ski	20
39	Paul	Beginner	ski	33

Activities

cid	slope-id	day
36	s3	01/05/09
36	s1	01/06/09
36	s1	01/07/09
87	s2	01/07/09
87	s1	01/07/09
34	s2	01/05/09

Slopes

slope-id	sname	Color
s1	Mountain Run	Blue
s2	Olympic Lady	Black
s3	Magic Carpet	Blue
s4	KT-22	green