CMPS 182, Strike Midterm Exam, Spring 2018, Shel Finkelstein

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Midterm Points

Part	Max Points	Points
I	30	
II	20	
III	24	
IV	27	
Total	101	

Part I (30 Points, 6 each): Questions 1-5 are about the instance of the table Scores that is on the page at the back of the test. You may tear that page off to do these questions. You don't have to turn in that page after the exam.

Show attribute names at the top of all SQL outputs.

What is the result of each of the following SQL queries? (Show attribute names at the top in all SQL results.)

Question 1:

```
SELECT Distinct Team
FROM Scores
WHERE Runs > 4;
```

Answer 1:

```
Team
---------
Giants
Tigers
Swallows
Dragons
Bay Stars
```

Question 2:

```
SELECT Day, Opponent
FROM Scores
WHERE Team LIKE '%n%'
ORDER BY Opponent;
```

Answer 2:

```
Day          Opponent
--------------------------------
Sunday       Carp
Monday       Carp
Sunday       Swallows
Monday       Swallows
```

The two first tuples could be switched. The two last tuples could also be switched.

Question 3:

```
SELECT S1.Team
FROM Scores S1
WHERE S1.Runs >
   ( SELECT S2.Runs
     FROM Scores S2
     WHERE S2.Team = S1.Opponent
          AND S1.Day = S2.Day );
```

Answer 3:

```
Team
-----------
Tigers
Swallows
Giants
Dragons
Bay Stars
Giants
```

The team tuples could appear in any order. There have to be 2 tuples with Giants as the team.

Question 4:

```
SELECT Day, SUM(Runs) AS TotalRuns
FROM Scores
WHERE Team IN ('Dragons', 'Swallows', 'Giants')
GROUP BY Day;
```

Answer 4:

```
day           totalruns
------------------------------
Monday        11
Sunday        15
```

Question 5:

Write a SQL statement that changes the Scores table so that Runs value for every Monday tuple is doubled.

(This statement should work for any instance of the Scores table, not just the instance that you've been given on the last page of the Midterm.)

Answer 5:

```
UPDATE Scores
SET runs = 2 * runs
WHERE Day = 'Monday';
```

Part II (20 points, 4 each): The questions in PART II are about the table:
Employees(name, age, salary, department)

where name is the primary key, name and department are character types, age and salary are integers, and salary can be NULL.

Answer **YES** or **NO** to each question.

Question 6: Is the following a legal SQL query?

```
SELECT MAX(age), MIN(salary), department
FROM Employees
WHERE salary > 5000
GROUP BY department;
```

Answer 6: ____YES____

Question 7: Are the following two SQL queries equivalent?

```
SELECT COUNT(*)                    SELECT COUNT(salary)
FROM Employees;                    FROM Employees;
```

Answer 7: ____NO_____

Question 8: Does the following SQL query output the names of all the Employees whose salary isn't NULL?

```
SELECT name
FROM Employees
WHERE salary <> NULL;
```

Answer 8: ____NO_____

Question 9: Can you create an index on Employees on (department, age)?

Answer 9: ____YES____

Question 10: If you define a view on Employees, then the output of that view is then calculated and stored in the database.

Answer 10: ____NO_____

Part III (24 points, 6 each): Answer questions 11-14.

Question 11: If R(A,B) is a relation where A's domain is (a1, a2, a3) and B's domain is (b1, b2, b3, b4), what the maximum number of different tuples that can be in an instance of R, assuming that A can't be NULL but B can be NULL?

Answer 11: ____15_____

Question 12: Let S(A,B,C) be a relation where A is the primary key for S and B and C can't be NULL. Assume that A's domain has 10 different values, B's domain has 3 different values, and C's domain has 4 different values. What is the maximum number of different tuples that can be in an instance of S?

Answer 12: ____10_____

Question 13: We discussed the ACID properties for transactions. The letter "I" in ACID stands for Isolation. Serializability and Read Committed are Isolation levels. Briefly explain each of those Isolation levels.

Answer 13a: Serializability

Serializability means that transaction execution is equivalent to executing them one-by-one in some order.

Answer 13b: Read Committed

Read Committed means that transactions only read data values that were written by transactions that committed.

Question 14: Suppose that our database schema contains a table Movies, whose key is (title, year). title is CHAR(40) and year is INTEGER.

Movies(title, year, length, genre, studioName, producerC#)

Our database schema also has a view ParamountMovies defined by:

```
CREATE VIEW ParamountMovies AS
        SELECT title , year
        FROM Movies
        WHERE studioName = ‘Paramount ';
```

Suppose that we execute the following statement:

```
INSERT INTO ParamountMovies VALUES (‘StarTrek’, 1979);
```

Explain when that statement will result in an error, and when that statement will not result in an error.

Answer 14:

If all of the attributes of Movies that aren’t in the view, namely length, genre, studioName and producerC#, either have a DEFAULT value, or are allowed to be NULL (because they don’t have NOT NULL specified), or both, then that INSERT statement will not result in an error.

However, if at least one of the attributes length, genre, studioName and producerC# doesn’t have a DEFAULT and also has NOT NULL specified, then that INSERT will result in an error.

Part IV (27 points, 9 each):

Question 15-17 are about the following familiar tables. Primary keys are underlined. The attribute cname in Customers is UNIQUE. Assume that there are no other constraints.

Customers(cid, cname, level, type, age)

Activities(cid, slopeid, day)

Slopes(slopeid, sname, color)

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

Question 15: Find the names of all the customers who went on the slope named 'Olympic Lady' on 02/07/18. No name should appear more than once in your result.

Answer 15:

```
SELECT DISTINCT c.cname
FROM Customers c, Activities a, Slopes s
WHERE c.cid = a.cid
AND a.day = DATE '02/07/18'
AND a.slopeid = s.slopeid
AND s.sname='Olympic Lady';
```

Customers(cid, cname, level, type, age)

Activities(cid, slopeid, day)

Slopes(slopeid, sname, color)

Question 16: Write a SQL query that outputs the age of the oldest person who had an activity on that day, for each day on which there was an activity. Only the day and the oldest age for that day should be in the result. The attributes in your result should be called day and oldestAge.

Answer 16:

```
SELECT a.day, MAX(c.age) AS oldestAge
FROM Customers c, Activities a
WHERE c.cid = a.cid
GROUP BY a.day;
```

Customers(cid, cname, level, type, age)

Activities(cid, slopeid, day)

Slopes(slopeid, sname, color)

Question 17: For each customer who did an activity, find the number of different slopes for which that customer did an activity. Your output should have the customer's cid and the number of different slopes for that customer; these attributes should appear as cid and diffSlopes. In your output, the tuple with the greatest value of cid should come first and the tuple with the smallest value of cid should come last.

Answer 17:

```
SELECT c.cid, COUNT(DISTINCT a.slopeid) as diffSlopes
FROM Activities a, Customers c
WHERE a.cid = c.cid
GROUP BY c.cid
ORDER BY c.cid DESC;
```

This instance of the Scores table is referenced in Part I of the Midterm (Questions 1-5). You may tear this page off to do these questions. You don't have to turn in this page after the exam.

Here are the Scores from the Japanese Baseball League. (Team, Day) is the primary key of the Scores table.

Scores

Team	Day	Opponent	Runs
Dragons	Sunday	Swallows	4
Tigers	Sunday	Bay Stars	9
Carp	Sunday	Giants	2
Swallows	Sunday	Dragons	7
Bay Stars	Sunday	Tigers	2
Giants	Sunday	Carp	4
Dragons	Monday	Carp	6
Tigers	Monday	Bay Stars	5
Carp	Monday	Dragons	3
Swallows	Monday	Giants	0
Bay Stars	Monday	Tigers	7
Giants	Monday	Swallows	5