CMPS 182 Midterm Exam, Spring 2019, Shel Finkelstein

Student Name: _____

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Midterm Points

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

Closed book, but okay to bring a single two-sided 8.5" x 11" sheet of paper with as much info written on it as you can fit and read unassisted. Please hand in Midterm and your sheet of paper (with name on top right) when you finish the Midterm. You must also show your UCSC ID when you hand in the Midterm.

You may write answers on the backs of previous pages of the exam if you need extra space. Please indicate which questions you're answering if you do this.

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.

What is the result of each of the following SQL queries?

Be sure to show attribute names at the top of all SQL outputs!

Question 1:

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

Answer 1:

Question 2:

```
SELECT Day, Team
FROM Scores
WHERE Team LIKE '%a%'
ORDER BY Day, Team DESC;
```

Answer 2:

Question 3:

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

Answer 3:

Question 4:

```
SELECT Team, MAX(Runs) AS MaxRuns
FROM Scores
GROUP BY Team;
```

Answer 4:

Question 5:

Write a SQL statement that changes the Scores table so that all tuples in which Opponent is Giants are deleted.

(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:

Part II (20 points, 4 each): The questions in PART II are all about a table Employees that was created as follows:

```
CREATE TABLE Employees (
        name        CHAR(30) PRIMARY KEY,
        age         INTEGER NOT NULL,
        salary      INTEGER,
        department  CHAR(20)
    );
```

Answer **YES** or **NO** to each question in Part II.

Question 6: In an instance of Employees there can't be two different tuples that have identical values for both name and age.

Answer 6: _____

Question 7: Are the following two SQL queries equivalent?

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

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

Answer 7: _____

Question 8: The attribute age cannot be NULL, but all of the other attributes of Employees can be NULL.

Answer 8: _____

Question 9: Is the following a legal SQL query?

```
SELECT department, MIN(age), MIN(salary)
FROM Employees
WHERE salary > 8000
GROUP BY department;
```

Answer 9: _____

Question 10: Does the following SQL query output the names of all Employees whose age is 25 and whose salary is NULL?

```
SELECT e.name
FROM Employees e
WHERE e.age = 25
    AND e.salary = NULL;
```

Answer 10: _____

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) and B's domain is (b1, b2, b3, b4, b5), what the maximum number of different tuples that can be in an instance of R, assuming that A can be NULL, but B can't be NULL?

Answer 11: _____

Question 12: Let S(A,B,C) be a relation where A is the primary key for S, and no attribute can be NULL. Suppose that A's domain has 10 different values, B's domain has 5 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: _____

Question 13: We discussed the ACID properties for transactions. The letter "A" in ACID stands for Atomicity. Briefly explain what Atomicity means. Your answer should include an explanation, not just a phrase.

Answer 13:

Question 14: SQL uses 3-valued logic, with TRUE, FALSE and UNKNOWN. Fill in the truth table for OR.

Answer 14:

P	Q	P OR Q
TRUE	TRUE	
TRUE	FALSE	
TRUE	UNKNOWN	
FALSE	TRUE	
FALSE	FALSE	
FALSE	UNKNOWN	
UNKNOWN	TRUE	
UNKNOWN	FALSE	
UNKNOWN	UNKNOWN	

Part IV (27 points, 9 each):

Question 15-17 are about the following familiar tables. Primary keys are underlined. Assume that there are no other constraints.

Products(productID, productName, manuf, normalPrice, discount)

Customers(customerID, custName, address, joinDate, amountOwed, lastPaidDate, status)

Stores(storeID, storeName, region, address, manager)

Days(dayDate, category)

Sales(productID, customerID, storeID, dayDate, paidPrice, quantity)

Question 15: Find the storeID and name for all stores in the South region whose address has W (capital W) as its second letter. No duplicates should appear in your result.

Answer 15:

Products(productID, productName, manuf, normalPrice, discount)

Customers(customerID, custName, address, joinDate, amountOwed, lastPaidDate, status)

Stores(storeID, storeName, region, address, manager)

Days(dayDate, category)

Sales(productID, customerID, storeID, dayDate, paidPrice, quantity)

Question 16: Output the productName, manuf and dayDate for each product that's manufactured by Kellogs where there was at least one sale on that dayDate. No duplicates should appear in your result.

Answer 16:

Products(productID, productName, manuf, normalPrice, discount)

Customers(customerID, custName, address, joinDate, amountOwed, lastPaidDate, status)

Stores(storeID, storeName, region, address, manager)

Days(dayDate, category)

Sales(productID, customerID, storeID, dayDate, paidPrice, quantity)

Question 17: quantity is an attribute in the Sales table. For each customerID, find the total quantity of sales that occurred for that customerID before March 1, 2018.

Attributes in your output should appear as theCustID and totQuant. In your output, tuples with a bigger total quantity should come before tuples with a smaller total quantity.

Answer 17:

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