

## CSE 182 Midterm Exam, Spring 2022, Shel Finkelstein

**Student Name:** \_\_\_\_\_

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### Midterm Points:

Part	Max Points
I	30
II	20
III	24
IV	27
<b>Total</b>	101

Closed book, but it's 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.

Be sure to answer each question readably in the space provided.

**Part I** (30 Points, 6 each): Questions 1-5 are about the instance of the table Scores that you have been given as a separate piece of paper.

**Do not turn in that page when you hand in your Midterm!**

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 '%ar%'  
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, SUM(Runs) AS RunTotal  
FROM Scores  
GROUP BY Team;
```

**Answer 4:**

**Question 5:**

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

This statement should work for any instance of the Scores table, not for 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 DEFAULT(21),  
    salary    INTEGER,  
    department CHAR(20) NOT NULL  
);
```

Answer **YES** or **NO** to each question in Part II, writing out the full word.

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

**Answer 6:** \_\_\_\_\_

**Question 7:** Two SQL queries are Equivalent if they always have the same result on any legal database.

Are the following two SQL queries Equivalent?

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

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

**Answer 7:** \_\_\_\_\_

**Question 8:** Is the following a legal SQL query?

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

**Answer 8:** \_\_\_\_\_

**Question 9:** Does the following SQL query output the names of all Employees whose age is 32 and whose salary is NULL?

```
SELECT e.name  
FROM Employees e  
WHERE e.age = 32  
      AND e.salary = NULL;
```

**Answer 9:** \_\_\_\_\_

**Question 10:** Are the following two SQL queries Equivalent?

```
SELECT e.name  
FROM Employees e  
WHERE e.age NOT IN ( SELECT e2.age  
                     FROM Employees e2  
                     WHERE department = 'Sales' );
```

```
SELECT e.name  
FROM Employees e  
WHERE e.age != ANY ( SELECT e2.age  
                    FROM Employees e2  
                    WHERE department = 'Sales' );
```

**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  $(a1, a2, a3)$  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?

Just supply your answer; no part credit.

**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 5 different values,  $B$ 's domain has 2 different values, and  $C$ 's domain has 6 different values. What is the maximum number of different tuples that can be in an instance of  $S$ ?

Just supply your answer; no part credit.

**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 provide an explanation, not just a phrase.

**Answer 13:**

**Question 14:** SQL uses 3-valued logic, with values TRUE, FALSE and UNKNOWN. What is the value of each of the following three expressions?

**14a):** FALSE AND UNKNOWN

**Answer 14a):** \_\_\_\_\_

**14b):** UNKNOWN OR TRUE

**Answer 14b):** \_\_\_\_\_

**14c):** TRUE AND NOT UNKNOWN

**Answer 14c):** \_\_\_\_\_

**Part IV** (27 points, 9 each):

The questions in Part IV ask you to write SQL statements using the tables shown below, which are 3 of the tables in our Lab Assignments.

The Primary Key in each table is shown underlined. Assume that there aren't any NOT NULL or UNIQUE constraints specified for these tables. Data types aren't shown to keep things simple. There aren't any trick questions about data types.

**RacingPersons**(personID, personName, registryDate, canBeJockey, canBeTrainer)

**Stables**(stableID, stableName, address, stableOwnerID)

**Horses**(horseID, horseName, horseBreed, birthDate, stableID, trainerID, horseOwnerID)

You should assume the following Foreign Keys:

- Every stableOwnerID in Stables appears as a personID in RacingPersons.
- Every stableID in Horses appears as a stableID in Stables.
- Every trainerID in Horses appears as a personID in RacingPersons.
- Every horseOwnerID in Horses appears as a personID in RacingPersons.

Tables and attributes are repeated at the top of each question, with Primary Keys underlined.

**RacingPersons**(personID, personName, registryDate, canBeJockey, canBeTrainer)

**Stables**(stableID, stableName, address, stableOwnerID)

**Horses**(horseID, horseName, horseBreed, birthDate, stableID, trainerID, horseOwnerID)

**Question 15:** For each horse whose name isn't NULL and who does not have 'Mr' (with that capitalization) as the first two characters in its name, find its horseID, its horseName, and the name of its trainer (which should appear in your result as trainerName).

No duplicates should appear in your result.

**Answer 15:**

**RacingPersons**(personID, personName, registryDate, canBeJockey, canBeTrainer)

**Stables**(stableID, stableName, address, stableOwnerID)

**Horses**(horseID, horseName, horseBreed, birthDate, stableID, trainerID, horseOwnerID)

**Question 16:** horseBreed and stableID are attributes in the Horses table. stableID identifies the stable that the horse is in. A horse is a Quarterhorse if its horseBreed value equals 'Q'.

For each stable that has no Quarterhorses in it, output the name of the stable, the name of the owner of the stable, and the address of the stable. These attributes should appear as stableName, stableOwner and stableAddress

The tuples in your result should be in reverse alphabetical order based on stableName. No duplicates should appear in your result.

**Answer 16:**

**RacingPersons**(personID, personName, registryDate, canBeJockey, canBeTrainer)

**Stables**(stableID, stableName, address, stableOwnerID)

**Horses**(horseID, horseName, horseBreed, birthDate, stableID, trainerID, horseOwnerID)

**Question 17:** horseBreed is an attribute in the Horses table that identifies the breed of the horse.

Find the breeds for which at least 5 horses of that breed were born on or after the date December 29, 2018. For each such breed, output the horseBreed, (which should appear as breed) and the number of horses who were born on or after that date (which should appear as breedTotal).

No duplicates should appear in your result.

**Answer 17:**