

CSE 180, Midterm Exam, Fall 2021, Shel Finkelstein

Student Name: _____

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Midterm Points

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

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

This exam is single sided, and you may write an answer on the blank side of a page, if you need more space. But if you do that, clearly identify question that you've answered.

Note: For questions that ask you to write SQL statement, points might be deducted if you write complicated queries, even if they are correct. You can lose credit if you use DISTINCT but it's not needed, and you will lose credit if you don't use DISTINCT and it is needed.

Part I: (30 points, 6 points each):

Question 1: $R(A, B, C)$ is a relation instance. If R has 5 tuples in it, then how many tuples are there in the result of the following SQL query?

```
SELECT *  
FROM R r1, R r2;
```

Answer 1: _____

Question 2: Let $R(A, B, C, D)$ be a relation, where (A, B) is the Primary Key for R , attribute C can be NULL, and attribute D cannot be NULL. Assume that attribute A 's domain has 5 different values, B 's domain has 3 different values, attribute C 's domain has 2 different values and attribute D 's domain has 4 different values.

What is the maximum number of tuples that can be in an instance of R ?

Answer 2: _____

Question 3: In our database, we have a table Movies in which (movieTitle, movieYear) is the Primary Key:

Movies (movieTitle , movieYear, length , genre , studioName , producerC#)

and a view PixarMovies that was created as follows:

```
CREATE VIEW PixarMovies AS
  SELECT movieTitle, movieYear
  FROM Movies
  WHERE studioName = 'Pixar';
```

Assume that ('Toy Story', 1995, 81, TRUE, 'Pixar', 7358) is a tuple in the Movies table, and that it is the only tuple in the Movies table whose studioName is 'Pixar'. (Yes, genre is Boolean; there's no trick here.)

3a): What is the result of the query? Show attribute names at the top of your answer.

```
SELECT * FROM PixarMovies;
```

Answer 3a):

3b): Suppose that we execute:

```
DELETE FROM Movies WHERE movieTitle = 'Toy Story' AND movieYear = 1995;
```

After this DELETE, what is the result of that same SELECT query? Show attribute names at the top of your answer.

```
SELECT * FROM PixarMovies;
```

Answer 3b):)

3c): Now let's assume that there are 50 Pixar movies in the Movies table. Explain what happens to the tuples in the Movies table after we execute:

```
DROP VIEW PixarMovies;
```

Answer 3c):

Question 4: If a tuple appears 20 times in the result for Q1 and that exact same tuple appears 4 times in the result for Q2, then:

4a): How many times would that tuple appear in Q1 UNION ALL Q2?

Answer 4a): _____

4b): How many times would that tuple appear in Q1 INTERSECT ALL Q2?

Answer 4b): _____

4c): How many times would that tuple appear in Q1 EXCEPT ALL Q2?

Answer 4c): _____

Question 5: Your answers to the following questions should provide a brief explanation, not just some buzzwords. Give just one answer for each.

5a): The SQL language is described as Declarative (or Non-Procedural). Explain why SQL is described as Declarative.

Answer 5a):

5b): The D in database ACID properties stands for Durability. Explain what Durability means.

Answer 5b):

Part II: (24 points, 8 points each):

Questions 6-8 are about the Scores(Team, Day, Opponent, Runs) relation instance that appears below. (Team, Day) is the Primary Key for Scores.

Be sure to show attribute names at the top for all your SQL query results!

Scores(Team, Day, Opponent, Runs)

Team	Day	Opponent	Runs
Dragons	Sunday	Swallows	3
Tigers	Sunday	Bay Stars	10
Carp	Sunday	Giants	2
Swallows	Sunday	Dragons	10
Bay Stars	Sunday	Tigers	1
Giants	Sunday	Carp	4
Dragons	Monday	Carp	9
Tigers	Monday	Bay Stars	9
Carp	Monday	Dragons	5
Swallows	Monday	Giants	0
Bay Stars	Monday	Tigers	6
Giants	Monday	Swallows	4

Question 6: For this instance of Scores, what is the result of the following SQL query?

```
SELECT Team, MIN(Runs) AS theMin  
FROM Scores  
GROUP BY Team;
```

Answer 6:

Question 7: For this instance of Scores, what is the result of the following SQL query?

```
SELECT S1.Day, S1.Team
FROM Scores S1, Scores S2
WHERE S1.Day = S2.Day
      AND S1.Team = S2.Opponent
      AND S1.Runs > S2.Runs
ORDER BY S1.Team;
```

Answer 7:

Question 8: For this instance of Scores, what is the result of the following SQL query?

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

Answer 8:

Part III: (20 points, 4 points each)

The following **TRUE** or **FALSE** questions all refer to the Customers table that is created by the following statement:

```
CREATE TABLE Customers (  
    cid          INTEGER,  
    name         VARCHAR(20) UNIQUE,  
    type         VARCHAR(20),  
    level        VARCHAR(20) DEFAULT 'Advanced' NOT NULL,  
    age          INTEGER,  
    PRIMARY KEY (cid)  
);
```

Answer each of these questions with **TRUE** or **FALSE**. No explanation is required, and no part credit will be given.

Question 9: TRUE or FALSE: If there are no tuples in the Customers table, and we execute the statement:

```
INSERT INTO Customers(cid, name)  
VALUES (41, 'Chou');
```

then the database system will return an error.

Answer 9: _____

Question 10: TRUE or FALSE: The following is a legal SQL query.

```
SELECT level, type, COUNT(*), MIN(age)  
FROM Customers  
WHERE type != 'snowboard'  
GROUP BY level;
```

Answer 10: _____

Question 11: TRUE or FALSE: The following two SQL statements are equivalent.

```
DELETE *  
FROM Customers;
```

```
DROP TABLE Customers;
```

Answer 11: _____

Question 12: TRUE or FALSE: The following two SQL queries are equivalent.

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

```
SELECT COUNT(level)  
FROM Customers;
```

Answer 12: _____

Question 13: TRUE or FALSE: The following two queries are equivalent.

```
SELECT c.cid  
FROM Customers c  
WHERE c.level != ANY ( SELECT c2.level  
                        FROM Customers c2  
                        WHERE c2.type = 'snowboard' );
```

```
SELECT c.cid  
FROM Customers c  
WHERE c.level NOT IN ( SELECT c2.level  
                      FROM Customers c2  
                      WHERE c2.type = 'snowboard' );
```

Answer 13: _____

Part IV: (27 points, 9 points 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, with some of the attributes removed.

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 thing simple. There aren't any trick questions about data types.

Persons(personID, lastName, firstName, isStudent)

Conferences(conferenceName, year, conferenceDate, regularAttendeeCost, studentAttendeeCost, submissionDueDate)

Attendees(attendeeID, conferenceName, year)

You should assume that the following Foreign Key relationships hold.

- Every attendeeID in Attendees appears as a personID in persons.
- Every (conferenceName, year) in Attendees appears as a (conferenceName, year) in Conferences.

Points might be deducted if you write complicated queries, even if they are correct. You can lose credit if you use DISTINCT but it's not needed, and you will lose credit if you don't use DISTINCT and it is needed.

You don't have to use views to answer any of these questions, but you may use views if you want, as long as you create them correctly before you use them.

Question 14: Write a SQL statement that finds the personID, lastName and firstName for each person whose first name has lowercase 't' as its second letter, and who attended a conference whose conferenceDate attribute isn't NULL.

The attributes in your result should appear as thePerson, theLastName and theFirstName.

No duplicates should appear in your result.

Answer 14:

Question 15: Write a SQL statement that finds the conferenceName, year, regularAttendeeCost and studentAttendeeCost of each conference for which

- studentAttendeeCost is more than regularAttendeeCost, and
- there are no attendees for that conference.

Tuples in the result should appear in alphabetical order based on conferenceName. If result tuples have the same conferenceName, then tuples which have later years should appear before tuples which have earlier years.

No duplicates should appear in your result.

Answer 15:

Question 16: Persons has a Boolean attribute **isStudent** that indicates whether the person is a student.

For each conference whose submissionDueDate is before December 5, 2020, find the number of students who attended that conference. But you should only include a tuple for a conference in your result if the number of students who attended that conference is more than 25.

The 3 attributes in your result should be conferenceName, year, and the number of students who attended the conference, which should appear as numStudentAttendees.

No duplicates should appear in your result.

Answer 16: