Endterm

Variant 1

Part 1 (10 points)

Please answer the following questions:

1. Suppose client C1 issues transactions T1;T2;T3 and client C2 concurrently issues transactions T3;T4. How many different "equivalent sequential orders" are there for these four transactions? Show each of them

2. Consider table Item(name,price) where name is a key, and the following two concurrent transactions.
T1:

```
Begin Transaction;
S1: Insert Into Item Values ('scissors',40);
S2: Update Item Set price = price + 30 Where name = 'pencil';
Commit;
```

T2:

```
Begin Transaction;
S3: Select Avg(price) As a1 From Item;
S4: Select Avg(price) As a2 From Item;
Commit;
```

Assume that the individual statements S1, S2, S3, and S4 always execute atomically. Suppose initially there are two tuples in Item: (pencil,20) and (pen,30). Each transaction runs once and commits. Transaction T1 always executes with isolation level *Serializable*.

(a) If transaction T2 executes with isolation level *Serializable*, what possible pairs of values a1 and a2 are returned by T2?

(b) If transaction T2 executes with isolation level *Repeatable-Read*, what possible pairs of values a1 and a2 are returned by T2?

(c) If transaction T2 executes with isolation level *Read-Committed*, what possible pairs of values a1 and a2 are returned by T2?

(d) If transaction T2 executes with isolation level *Read-Uncommitted*, what possible pairs of values a1 and a2 are returned by T2?

3. Consider a relation R(A) containing {(3),(6)} and two transactions: T1: Update R set A = A*2; T2: insert into R values (9). Suppose both transactions are submitted under the isolation and atomicity properties. What is the possible final states of R?

4. Consider the following base tables. Capitalized attributes are primary keys. All non-key attributes are permitted to be NULL.

```
MovieStar(NAME, address, gender, birthdate)
MovieExecutive(LICENSE#, name, address, netWorth)
Studio(NAME, address, presidentLicense#)
```

Each of the choices describes, in English, a view that could be created with a query on these tables. Which one can be written as a SQL view that is updatable according to the SQL standard and why?

a) A view "Birthdays" containing a list of birthdates (no duplicates) belonging to at least one movie star.

b) A view "StudioPres" containing the license number, name, address, of all executives who are studio presidents.

c) A view "GenderBalance" containing the number of male and number of female movie stars.

d) A view "StudioPresInfo" containing the studio name, executive name, and license number for all executives who are studio presidents.

Part 2 (5 points)

Please write SQL queries for following tasks. Consider following schemas:

Highschooler

ID	name	grade
1510	Jordan	9
1689	Gabriel	9
1381	Tiffany	9
1709	Cassandra	9
1101	Haley	10
1782	Andrew	10
1468	Kris	10
1641	Brittany	10
1247	Alexis	11
1316	Austin	11
1911	Gabriel	11
1501	Jessica	11
1304	Jordan	12
1025	John	12
1934	Kyle	12
1661	Logan	12

Friend

ID1	ID2
1510	1381
1510	1689
1689	1709
1381	1247
1709	1247
1689	1782
1782	1468
1782	1316
1782	1304
1468	1101
1468	1641
1101	1641
1247	1911

Likes

ID1	ID2
1689	1709
1709	1689
1782	1709
1911	1247
1247	1468
1641	1468
1316	1304
1501	1934
1934	1501
1025	1101

6. Find the names of all students who are friends with someone named Gabriel.

7. For every student who likes someone 2 or more grades younger than themselves, return that student's name and grade, and the name and grade of the student they like.

8. Find the name and grade of all students who are liked by more than one other student.

9. Find names and grades of students who only have friends in the same grade. Return the result sorted by grade, then by name within each grade.

10. For every pair of students who both like each other, return the name and grade of both students. Include each pair only once, with the two names in alphabetical order.