Problems

I. *Customers* is a table in a SQL Server database with schema *Customers[CustomerID, FirstName, LastName, City, DateOfBirth]*. The primary key is underlined.

CustomerID is the search key of the clustered index on *Customers.* The table doesn't have any other indexes.

Consider the interleaved execution below. There are no other concurrent transactions. The value of *City* for the customer with *CustomerID 2* is *Timisoara* when T1 begins execution.

Answer questions 1-3 (each question has at least one correct answer).

T1	**T2**
BEGIN TRAN SELECT City FROM Customers WHERE CustomerID = 2	
	BEGIN TRAN UPDATE Customers SET City = 'Cluj-Napoca' WHERE CustomerID = 2
UPDATE Customers SET City = 'Bucuresti' WHERE CustomerID = 2	
	ROLLBACK TRAN
COMMIT TRAN	

time

1. T1 and T2 run under READ UNCOMMITTED. After the *COMMIT TRAN* statement in T1, the *City* value for the customer with *CustomerID* 2 is:
a. *Timisoara*
b. *Cluj-Napoca*
c. *Bucuresti*
d. NULL
e. None of the above answers is correct.

2. T1 runs under READ COMMITTED and T2 under REPEATABLE READ. After the *COMMIT TRAN* statement in T1, the *City* value for the customer with *CustomerID* 2 is:
a. *Timisoara*
b. *Cluj-Napoca*
c. *Bucuresti*
d. NULL
e. None of the above answers is correct.

3. T1 runs under REPEATABLE READ and T2 runs under READ COMMITTED. Then:
a. T1 doesn't acquire a shared lock for its SELECT statement.
b. T1 acquires a shared lock for its SELECT statement.
c. T2 needs an exclusive lock for its UPDATE statement.
d. T1 needs an exclusive lock for its UPDATE statement.
e. None of the above answers is correct.

II. Create a database for a MiniFacebook system. The entities of interest to the problem domain are: *Users*, *Pages*, *Likes*, *Categories*, *Posts*, and *Comments.* Each user has a name, current city and date of birth. A user can like multiple pages. The system stores the date of each like. A page has a name and a category, e.g., *sports*, *movies*, *music*, etc. A category also has a category description. Users write posts and comment on existing posts. A user's post has a date, text, and number of shares. A comment is anonymous, has a text, a date, and a flag indicating whether it's a top comment for the corresponding post.

1. Write an SQL script that creates the corresponding relational data model.

2. Create a Master/Detail Form that allows one to display the posts for a given user, to carry out <insert, update, delete> operations on the posts of a given user. The form should have a *DataGridView* named *dgvUsers* to display the users, a *DataGridView* named *dgvPosts* to display all the posts of the selected user, and a button for saving added / deleted / modified posts. You must use the following classes: *DataSet, SqlDataAdapter, BindingSource.*

3. Create a scenario that reproduces the non-repeatable read concurrency issue on this database. Explain why the non-repeatable read occurs, and describe a solution to prevent this concurrency issue. Don't use stored procedures.

I.	1	1p
	2	1p
	3	1p
II.	1	2p
	2	2p
	3	2p
		1p of