Problems

I Let R be a table in a SQL Server database with schema R[FK1, FK2, C1, C2, C3, C4, C5]. The primary key is {FK1, FK2}. Answer questions 1-3 using the legal instance below (each question has at least one correct answer).

FK1	FK2	C1	C2	C3	C4	C5
1	1	Pisica pe acoperisul fierbinte	Tennessee Williams	100	20	AB
1	2	Conul Leonida fata cu reactiunea	Ion Luca Caragiale	50	50	CQ
1	3	Concert din muzica de Bach	Hortensia Papadat-Bengescu	50	10	QC
2	1	Fata babei si fata mosneagului	Ion Creanga	100	100	QM
2	2	Frumosii nebuni ai marilor orase	Fanus Neagu	10	10	BA
2	3	Frumoasa calatorie a ursilor panda povestita de un saxofonist care avea o iubita la Frankfurt	Matei Visniec	100	20	MQ
3	1	Mansarda la Paris cu vedere spre moarte	Matei Visniec	200	10	PQ
3	2	Richard al III-lea se interzice sau Scene din viata lui Meyerhold	Matei Visniec	100	50	PQ
3	3	Masinaria Cehov. Nina sau despre fragilitatea pescarusilor impaiati	Matei Visniec	100	100	AZ
4	1	Omul de zapada care voia sa intalneasca soarele	Matei Visniec	100	100	CP
4	2	Extraterestrul care isi dorea ca amintire o pijama	Matei Visniec	50	10	CQ
4	3	O femeie draguta cu o floare si ferestre spre nord	Edvard Radzinski	10	100	CP
4	4	Trenul din zori nu mai opreste aici	Tennessee Williams	200	200	MA

1. Consider query Q below:

SELECT C2, SUM(C3) TotalC3, AVG(C3) AvgC3
FROM R
WHERE C3 >= 100 OR C1 LIKE '%Pisica%'
GROUP BY C2
HAVING SUM(C3) > 100

a. Q returns 3 records and value *Matei Visniec* is in its result set.
b. Q returns 3 records and value *Matei Visniec* is not in its result set.
c. Q returns 2 records and value *Ion Creanga* is not in its result set.
d. Q returns 2 records and value *Ion Creanga* is in its result set.
e. None of the above answers is correct.

2. How many records does the following query return?

SELECT *
FROM
  (SELECT FK1, FK2, C3+C4 TotalC3C4
  FROM R
  WHERE FK1 = FK2) r1
      INNER JOIN
  (SELECT FK1, FK2, C5
  FROM R
  WHERE C5 LIKE '%Q%') r2 ON r1.FK1 = r2.FK1 AND r1.FK2 = r2.FK2

a. 2

b. 8

c. 0

d. 1

e. None of the above answers is correct.

3. Table R has a single trigger defined on it:

```
CREATE OR ALTER TRIGGER TrOnUpdate
  ON R
  FOR UPDATE
AS
  DECLARE @total INT = 0
  SELECT @total = SUM(i.C3 - d.C3)
  FROM deleted d INNER JOIN inserted i ON d.FK1 = i.FK1 AND d.FK2 = i.FK2
  WHERE d.C3 < i.C3
  PRINT @total
```

What's the value returned by the PRINT statement in the trigger when the UPDATE below is executed?

```
UPDATE R
SET C3 = 300
WHERE FK1 < FK2
```

a. 550

b. 700

c. 650

d. 600

e. None of the above answers is correct.

II

Create a database to manage train schedules. The database will store data about the routes of all the trains. The entities of interest to the problem domain are: *Trains*, *Train Types*, *Stations, and Routes*. Each train has a name and belongs to a type. A train type has a name and a description. Each station has a name. Station names are unique. Each route has a name, an associated train, and a list of stations with arrival and departure times in each station. Route names are unique. The arrival and departure times are represented as hour:minute pairs, e.g., train arrives at 5 pm and leaves at 5:10 pm.

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

2. Implement a stored procedure that receives a route, a station, arrival and departure times, and adds the station to the route. If the station is already on the route, the departure and arrival times are updated.

3. Create a view that shows the names of the routes that pass through all the stations.

4. Implement a function that lists the names of the stations with more than R routes, where R is a function parameter.