

2006 Paper 6 Question 8

Databases

Suppose we have the following relational schema

```
Person(pid:integer, name:string, street:string, postcode:string)
Car(cid:integer, year:integer, model:string)
OwnedBy(pid:integer, cid:integer)
AccidentReport(rid:integer, damage:integer, details:string)
ParticipatedIn(pid:integer, rid:integer, cid:integer)
```

where the underlined attributes represent the primary keys of the associated relation. The table *OwnedBy* implements a relationship between persons and cars using foreign keys. The table *ParticipatedIn* implements a relationship between persons, accident reports, and cars, where tuple (p, r, c) indicates that the person p was the driver of the car c associated with the accident report r .

- (a) Write an SQL query to return those pid 's of persons driving in at least one accident, with no duplicates. [2 marks]
- (b) Write an SQL query to return all tuples (pid, c) , where c is the number of cars owned by person pid (records where $c = 0$ do not have to be generated). [2 marks]
- (c) Write an SQL query to return all tuples (cid, c) , where c is the number of persons owning car cid (records where $c = 0$ do not have to be generated). [2 marks]
- (d) Write a (nested) SQL query to return all tuples (pid, rid) where pid was driving in the accident reported in rid , but the car driven by pid is not owned by pid . [4 marks]
- (e) Write an SQL query to return all tuples (rid, c) , where c is the number of drivers involved in the accident reported in by rid (records where $c = 0$ do not have to be generated). [2 marks]
- (f) Write an SQL query to return all tuples (rid, c) , where c is the number of cars involved in the accident reported in by rid (records where $c = 0$ do not have to be generated). [2 marks]
- (g) Do the functional dependencies implied by the schema imply that the results of queries (e) and (f) will always be the same? Explain. [2 marks]
- (h) Perhaps there is something wrong with this schema. How would you fix the schema to ensure that results of queries (e) and (f) would always be the same? [4 marks]