P3: UNIT 2

Consider the following relational schema about a local police station. Note that data types have been omitted:

```
POLICE(pol_num, name, telephone, age, categ)
  PK: {pol_num}
  NNV: {name, categ}
  FK: {categ} → CATEGORY

VEHICLE (plate_num, make, model, year)
  PK: {plate_num}
  NNV: {year}

CATEGORY (categ, grup, function, salary)
  PK: {categ}
  NNV: {grup}

PATROL (plate_num, date)
  PK: {plate_num, date}
  FK: {plate_num} → VEHICLE

MEMBER (pol_num, plate_num, date)
  PK: {pol_num, plate_num, date}
  FK: {pol_num} → POLICE
  FK: {plate_num, date}→ PATROL

INCIDENT(inc_num, date, time, type, location)
  PK: {inc_num}
  NNV: {date, type, location}

ATTEND (plate_num, date, inc_num)
  PK: {plate_num, date, inc_num}
  FK: {plate_num, date} → PATROL
  FK: {inc_num} → INCIDENT
```

Where the meaning of the relations is the following:

- **POLICE**: Each police officer has a number (*police_num*) a *name*, a *telephone*, an *age,* and a category (*categ*).
- **VEHICLE**: Each vehicle has a plate number (*plate_num*), its *make*, *model* and manufacturing *year*.
- **CATEGORY**: Different categories (*categ*) of the police officers. Each category is divided into *group*s (A, B or C) has an associated *function*, and a *salary*.
- **PATROL**: The vehicle with *plate_num* is on patrol on day *date*. The same day there may be several vehicles on patrol.
- **MEMBER**: The police officer *pol_num* has been assigned to a Patrol with *plate_num* on *date*.
- **INCIDENT**: The incident identified by a number (*inc_num*) happened on *date* at *time* in *location* and has a *type*.
- **ATTEND**: List of Patrols attending each incident.

Write the following SQL queries:

1. List the plate_num, make and model of the oldest vehicle which has attended an incident of type ’street racing’. (0.4 points).
2. List for all the vehicles in the database, the model, year and total amont of days attending incidences. (0.4 points).
3. List the name and age of those police officers who have attended all the incidences of type ‘robbery’. (0.4 points).
4. List the incident type that happened most frequently from 1AM to 7AM. (0.4 points).
5. List the incident types that happened all the days in which there was a patrol patrolling (every day, in which there was at least one patrol on the streets, this type of incident happended) (0.6 points).
6. Create a view called *Lucky_Police* which selects the name, and the function associated to the category of the police officers who haven’t been members of any patrol, and have a salary greater than the average salary of the categories of the group ‘A’. (0.6 points).
7. Is this view updatable ? Briefly explain your answer. (0.2 points).

EXAMEN DE BASES DE DATOS Y SISTEMAS DE INFORMACIÓN (25/11/19)

SOLUTIONS

1.-

```
SELECT DISTINCT V.plate_num, V.make, V.model
FROM Vehicle V, Attend A, Incident I
WHERE V.plate_num = A.plate_num
    AND A.inc_num = I.inc_num
     AND I.type = ‘street racing’
     AND V.year = (SELECT MIN(V.year)
                    FROM Vehicle V, Attend A, Incident I
                    WHERE V.plate_num = A.plate_num
                         AND A.inc_num = I.inc_num
                         AND I.type = ‘street racing’);
```

--- ALTERNATIVE -------

```
SELECT V.plate_num, V.make, V.model
FROM Vehicle V
WHERE V.plate_num IN (SELECT A.plate_num
                       FROM Attend  A, Incident I
                       WHERE A.inc_num = I.inc_num
                         AND I.type = ‘street racing)
    AND V.year = (SELECT MIN(V.year)
                   FROM Vehicle V, Attend  A, Incident I
                   WHERE V.plate_num = A.plate_num
                      AND A.inc_num = I.inc_num
                       AND I.type = ‘street racing) ;
```

2.-

```
SELECT V.model, V.year, COUNT(DISTINCT A.date)
FROM Vehicle V LEFT Attend A ON (V.plate_num = A.plate_num)
GROUP BY V.plate_num, V.model, V.year;
```

--- ALTERNATIVE -------

```
SELECT V.model, V.year, (SELECT COUNT(DISTINCT A.date)
                          FROM Attend  A
                          WHERE V.plate_num = A.plate_num)
FROM Vehicle V;
```

3.-

```
SELECT name, age
FROM POLICE PO
WHERE NOT EXISTS (SELECT *
                   FROM Incident I
                   WHERE I.type = ‘robbery’
                      AND NOT EXISTS (SELECT *
                                      FROM Attend A, Member M
                                      WHERE A.inc_num = I.inc_num
                                        AND A.plate_num = M.plate_num
                                        AND A.date = M.date
                                       AND M.pol_num = PO.pol_num))
AND EXISTS (SELECT *
             FROM Incident I
             WHERE I.type = ‘robbery’ )
```

--- ALTERNATIVE -------

```
SELECT name, age
FROM Police PO
WHERE (SELECT COUNT(I.inc_num)
        FROM Incident I
        WHERE I.type = ‘robbery’) = (  SELECT COUNT(DISTINCT I.inc_num)
                                    FROM Incident I, Attend  A, Member M
                                    WHERE I.type = ‘robbery’
                                      AND A.inc_num = I.inc_num
                                      AND A.plate_num = M.plate_num
                                      AND A.date = M.date
                                      AND M.num_p = PO.num_p)
        AND (SELECT COUNT(*)
              FROM Incident I
              WHERE I.type = ‘robbery’) > 0
```

4.-

```
SELECT I.type
FROM Incident I
WHERE time BETWEEN ’01:00’ AND ’07:00’
GROUP BY I.type
HAVING COUNT(*) = (SELECT MAX(COUNT(*))
                   FROM Incident I
                   WHERE time BETWEEN ’01:00’ AND ’07:00’
                   GROUP BY I.type)
```

5.-

```
SELECT DISTINCT I.type
FROM Incident I
WHERE (SELECT COUNT(DISTINCT date)  FROM Patrol P) =  ( SELECT COUNT(DISTINCT date)
                                                     FROM Incident I2, Patrol P
                                                      WHERE I.type = I2.type
                                                      AND I2.date = P.date
                                                       AND (SELECT COUNT(DISTINCT date)
                                                            FROM Patrol ) > 0
```

--- ALTERNATIVE -------

```
SELECT DISTINCT I.type
FROM Incident I
WHERE NOT EXISTS (SELECT *
                   FROM Patrol P
                   WHERE NOT EXISTS (SELECT *
                                      FROM Incident I2
                                      WHERE P.date = I2.date
                                        AND I2.type = I.type))
AND EXISTS (SELECT * FROM Patrol P)
```

--- ALTERNATIVE -------

```
SELECT I.type
FROM Incident I
GROUP BY I.type
HAVING COUNT(DISTINCT date) = (SELECT COUNT(DISTINCT date)
                               FROM Incident I2, Patrol P
                               WHERE P.date = I2.date
```

```
                                   AND I2.type = I.type)
```

6.-

```
CREATE VIEW Lucky_Police AS
SELECT P.name, C.function
FROM Police P, Category C
WHERE P.categ = C.categ
  AND C.salary > (SELECT AVG(C1.salary)
                  FROM Category C1
                  WHERE C1.group = ‘A’)
  AND NOT EXISTS (SELECT *
                   FROM Member M
                   WHERE P.pol_num = M.pol_num);
```

7.-

Some updates are possible, while other are not:

- Insert into *Lucky_Police* is not possible
- Update the *name* attribute in *Lucky_Police* is possible
- Update the *function* attribute in in *Lucky_Police* is not possible
- Delete from *Lucky_Police* is possible