HOMEWORK 2

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INFO 210
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Problem 1:

(a) List the names of all European cities with population of more than 600,000.

$$\pi_{City.city\_name} \left(\sigma_{City.population>600,000 \,\cap\, Country.continent="Europe"} \left(Country \bowtie City \right) \right)$$

(b) List the names of all countries for which no cities have been entered into the City table.

$$\pi_{country\_name} \left(\left(\sigma_{country\_name} \, Country \right) / \left(\sigma_{country\_name} \, City \right) \right)$$

(c) List names and continents of countries that are either in Europe or whose capitals have a population of over 1 million.

$$\pi_{City.city\_name, \, Country.continent} \left(\sigma_{Country.country\_name="Europe" \,\cup\, City.is\_capital="yes" \,\cap\, City.population >1,000,000} \left(Country \bowtie City \right) \right)$$

(d) List all pairs of cities such that one of them is a capital of some country, and the other is a non-capital city in that same country. For each city in the pair, list its name.

$$\pi_{iscap.city\_name, \, nocap.city\_name} \left(\left(\rho_{iscap} \left(\sigma_{is\_capital="yes"} \, City \right) \right) \bowtie_{iscap.country=nocap.country} \left(\rho_{nocap} \left(\sigma_{is\_capital="no"} \, City \right) \right) \right)$$

Problem 2:

a.

```
insert into Courses (cid, did, name) values (310, 200, 'Human Computer Interaction II');
insert into Enrollment(cid, did, sid, term, grade) values (310, 200, 1, 'Winter 2017', 2);
insert into Enrollment(cid, did, sid, term, grade) values (310, 200, 2, 'Winter 2017', 3);
```

b.

```
select * from Courses;
select * from Enrollment;
```

```
SQL> select * from courses;

     CID        DID NAME                                                                    CREDITS
---------- ---------- ------------------------------------------------------------------ ----------
     101        100 Calculus 1                                                                   3
     101        200 Introduction to IT                                                           3
     210        200 Database Systems                                                             3
     310        200 Human Computer Interaction II                                                3

SQL>
```

Courses

```
SQL> select * from enrollment;

       DID        CID        SID TERM                  GRADE
---------- ---------- ---------- ---------------- ----------
       100        101          1 Fall 2012
       100        101          2 Fall 2012
       200        210          1 Spring 2012          2
       200        210          2 Spring 2012          3
       200        210          3 Spring 2012          4
       200        210          4 Spring 2012
       200        310          1 Winter 2017          2
       200        310          2 Winter 2017          3

8 rows selected.
```

Enrollment