

# Exercise sheet for Session 1

## Uncertain data management

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November 21st, 2016

### 1 Exercise 1.

<sup>1</sup> Consider a database schema that consists of the following tables:

- Supplier(**sid**, **sname**, **address**), indicating supplier details,
- Parts(**pid**, **pname**, **color**), indicating the details of each part, and
- Catalog(**sid**, **pid**, **cost**), listing the prices charged for parts by suppliers.

Write the following queries in relational algebra, relational calculus and SQL:

1. Find the names of suppliers who supply some red part.
2. Find the sids of suppliers who supply some red or green part.
3. Find the sids of suppliers who supply some red part or are at 221 Packer Street.
4. Find the sids of suppliers who supply some red part and some green part.
5. Find pairs of sids such that the supplier with the first sid charges more for some part than the supplier with the second sid.
6. Find the pids of parts supplied by at least two different suppliers.

### 2 Exercise 2.

Given two relations  $R_1$  and  $R_2$ , where  $R_1$  contains  $N_1$  tuples,  $R_2$  contains  $N_2$  tuples, and  $N_2 > N_1 > 0$ , give the minimum and maximum possible sizes (in tuples) for the resulting relation produced by each of the following relational algebra expressions:

1.  $R_1 \cup R_2$ ,
2.  $R_1 \cap R_2$ ,
3.  $R_1 - R_2$ ,
4.  $R_1 \times R_2$ ,
5.  $\sigma_{a=5}(R_1)$ ,
6.  $\pi_a(R_1)$ .

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<sup>1</sup>Exercises taken from *R. Ramakrishnan, J. Gehrke. Database Management Systems, 3rd ed. 2002.*