Exercises *Algebraic query optimization*

Hans Philippi

September 12, 2024

For exercise 2, 3 and 5, consider both sets and bags.

Exercise 1

Give a counterexample for the commutativity of the minus.

Exercise 2

Describe how a selection distributes over a minus (two possibilities). In other words: rewrite $\sigma_p(R - S)$

Exercise 3

Describe how a projection distributes over a minus.

Exercise 4

Describe how a selection distributes over a division.

Exercise 5

Rewrite $\Gamma_{A,F}(R \cup S)$ using distributivity. Note that F may refer to `MIN, MAX, SUM, COUNT, AVG`. The last two may require a different approach.

Exercise 6

Suppose we have the following query (in RA) on a database with scheme $R(ABCD), S(AEFG), T(EHK)$:

$$\pi_{CG}(\sigma_{D>=10 \wedge E<=20 \wedge (G>0 \vee K>0)}(R \bowtie S \bowtie T))$$

Rewrite this query according to the algebraic optimization rules.