

## Homework 1

assigned September 18; due October 2, 5pm

This is a pencil-paper assignment. If you wish, you can work in groups of three people (but submit only *one* assignment per group). When you submit the assignment, don't forget to indicate the section you are in.

Assignments are to be submitted to the course drop box, located in Bahen 2220.

Your name(s) and student number(s) should appear on the first page of the assignment. Pages must be numbered, and assignments must be stapled or – preferably – stapled *and* put in envelopes. If pages are missing, you won't be given any credit. For late assignment policies, consult the course webpage.

Consider the following relational schema describing concert halls, cities where they are located, and shows.

- `City(name, province, country)`
- `Hall(name, city, province, capacity)` (here `city` refers to the name attribute of `City` and `province` refers to the `province` attribute of `City`)
- `Show(title, artist, hall, attendance)` (here `hall` refers to the name attribute of `Hall`)

Write the following 8 queries in both Relational Algebra and SQL. In relational algebra, you are **not** allowed to use the linear notation and renaming of *relations* used in the text. You may use renaming of attributes. You may use numerical comparisons (e.g.,  $R.A > 5$ ) in both SQL and Relational Algebra.

Each question is worth 15 points (7 for SQL, 8 for Relational Algebra).

- (1) List names of concert halls in Toronto whose capacity exceeds 10,000.
- (2) List names of artists who performed before at least 10,000 spectators, together with cities where those performances took place.
- (3) Find all the provinces in Canada where Springsteen has performed.
- (4) Find all artists who performed at least three times in Ontario.
- (5) List all cities where Toronto symphony (value of the `title` attribute) under direction of Zukerman (value of the `artist` attribute) had a sold out concert.
- (6) List all artists who never played in Toronto.
- (7) List all artists who only played in Toronto.
- (8) List shows that played in every city in Québec.

Write the following 2 queries in both Relational Algebra and Relational Calculus. Same rules as before apply to Relational Algebra queries.

- (9) Find artists who performed in two different cities with the same name, but located in different provinces of the same country.
- (10) Find artists all of whose shows are sold out.

**TOTAL: 150 points.**