BMEG3120: Exercise List 2

Assume that we have these tables:

- **PROF**: schema (pid, name, dept, age), where *pid* means professor id, while the other attributes are self-explanatory. It has a candidate key \{pid\}.

- **COURSE**: schema (cid, title, cdept), where *cid* means course id, *title* is the title of a course, and *cdept* refers to the department that offers the course. It has a candidate key \{cid\}.

- **TEACH**: schema (pid, cid, year), where *pid* and *cid* are as explained before, and *year* refers to the year when the teaching happened. For example, a tuple \( (p_1, c_1, 2011) \) has the meaning that the professor with pid = \( p_1 \) taught the course with cid = \( c_1 \) in 2011. The table has a candidate key \{pid, cid, year\}.

Write relational algebra queries to solve the following problems.

**Problem 1.** Find the titles of all the courses offered in year 2011.

**Problem 2.** Find the names of the professors that taught at least one course offered by the CS department in 2011. Note: such a course may be taught by a professor that is not in the CS department.

**Problem 3.** Find the cids of the courses that have ever been taught by professors not in the corresponding course-offering departments. For example, if a course is offered by CS, but has been taught by a professor from EE, then the cid of the course should be reported.

**Problem 4.** Find the cids of the courses that have been taught only by professors not in the corresponding course-offering departments.

**Problem 5.** Find the pids of the professors that did not teach any course in 2011.

**Problem 6* (* means high difficulty).** Find the pid of the eldest professor, namely, the professor whose age is the greatest. If multiple professors have the same greatest age, their pids should all be reported.