CS250/219 Database Systems: Ex 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 (p1 , c1 , 2011) has the meaning that the professor with pid = p1 taught the course with cid = c1 in 2011.
  It 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.