DataBase Assignment

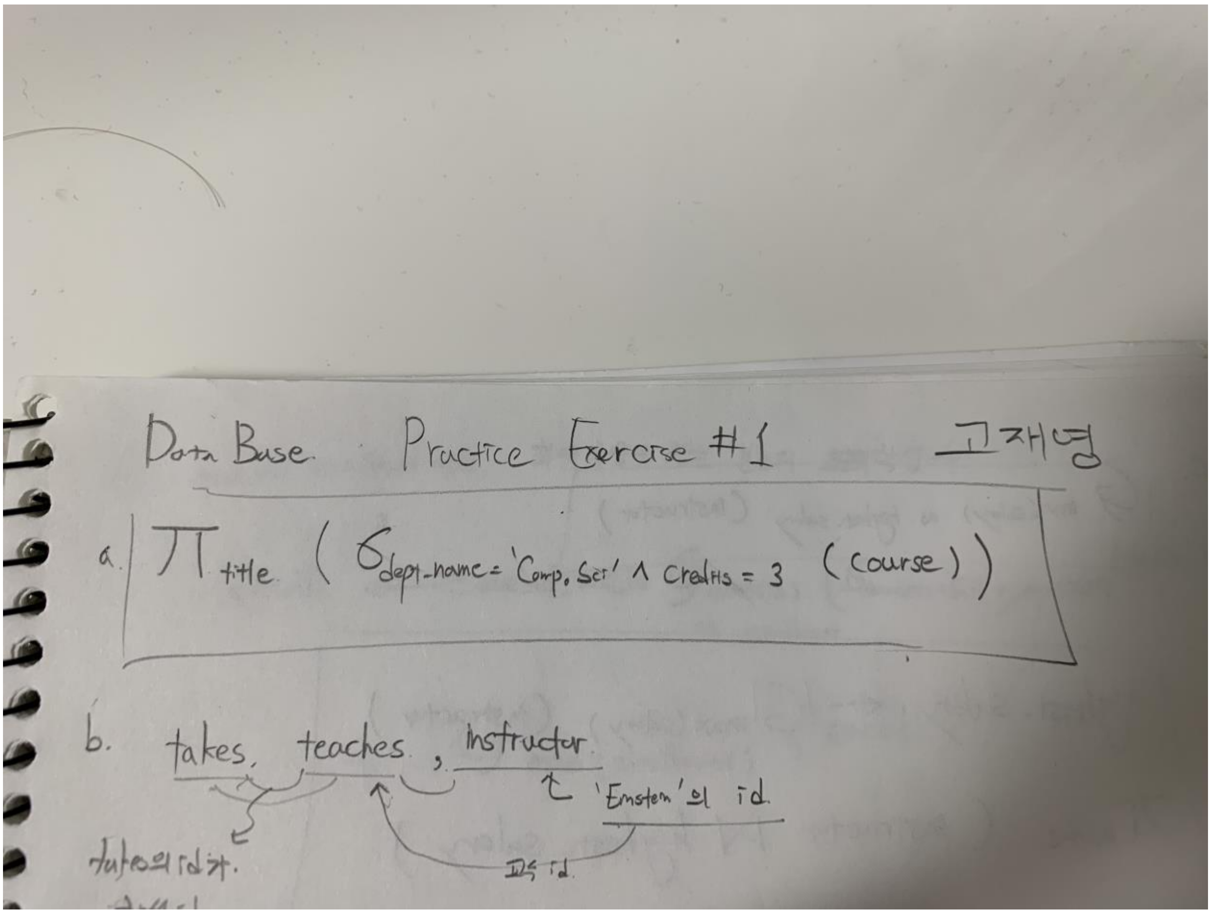
practice #4

정보대학 컴퓨터학과 2017320108 고재영

- Relational Algebra를 써내려가야 하기 때문에, word typing이 아닌, 자필로 작성하였습니다.
- 스캔할 상황이 여의치 않아, 카메라로 캡쳐한 이미지를 첨부합니다.

Write the following queries in relational algebra, using the university schema

a. Find the titles of courses in the Comp. Sci. department that have 3 credits.



Data Base Practice Exercise #1 고재영

a. $\Pi_{title}\left(\sigma_{dept\_name='Comp.\ Sci' \wedge Credits=3}(course)\right)$

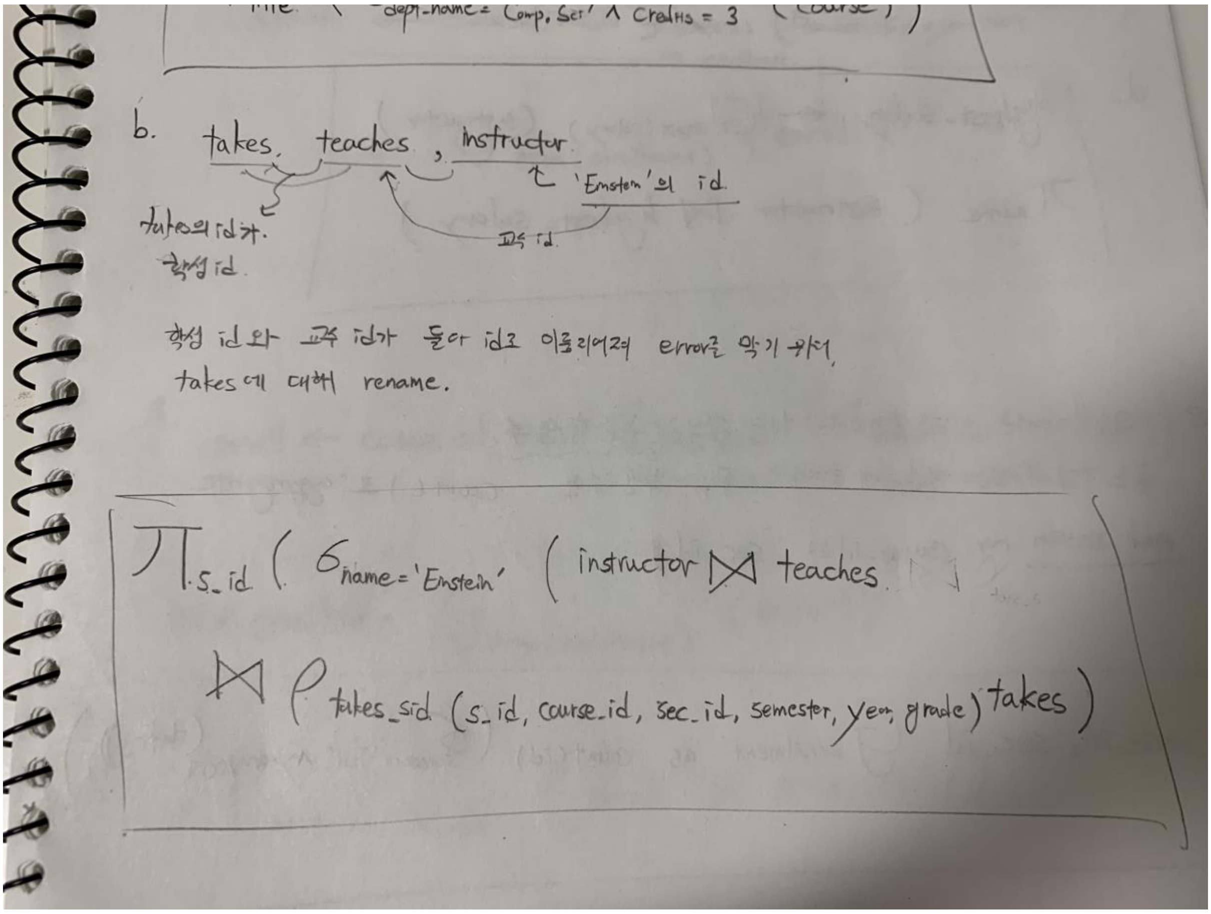
b. takes, teaches, instructor

'Einstein'의 id.

교수 id.

takes의 id가.

b.Find the IDs of all students who were taught by an instructor named Einstein; make sure there are no duplicates in the result.



tle ($\sigma_{dept\_name= 'Comp. Sci' \wedge credits = 3}$ (course))

b. takes, teaches, instructor

takes의 id가 학생 id.

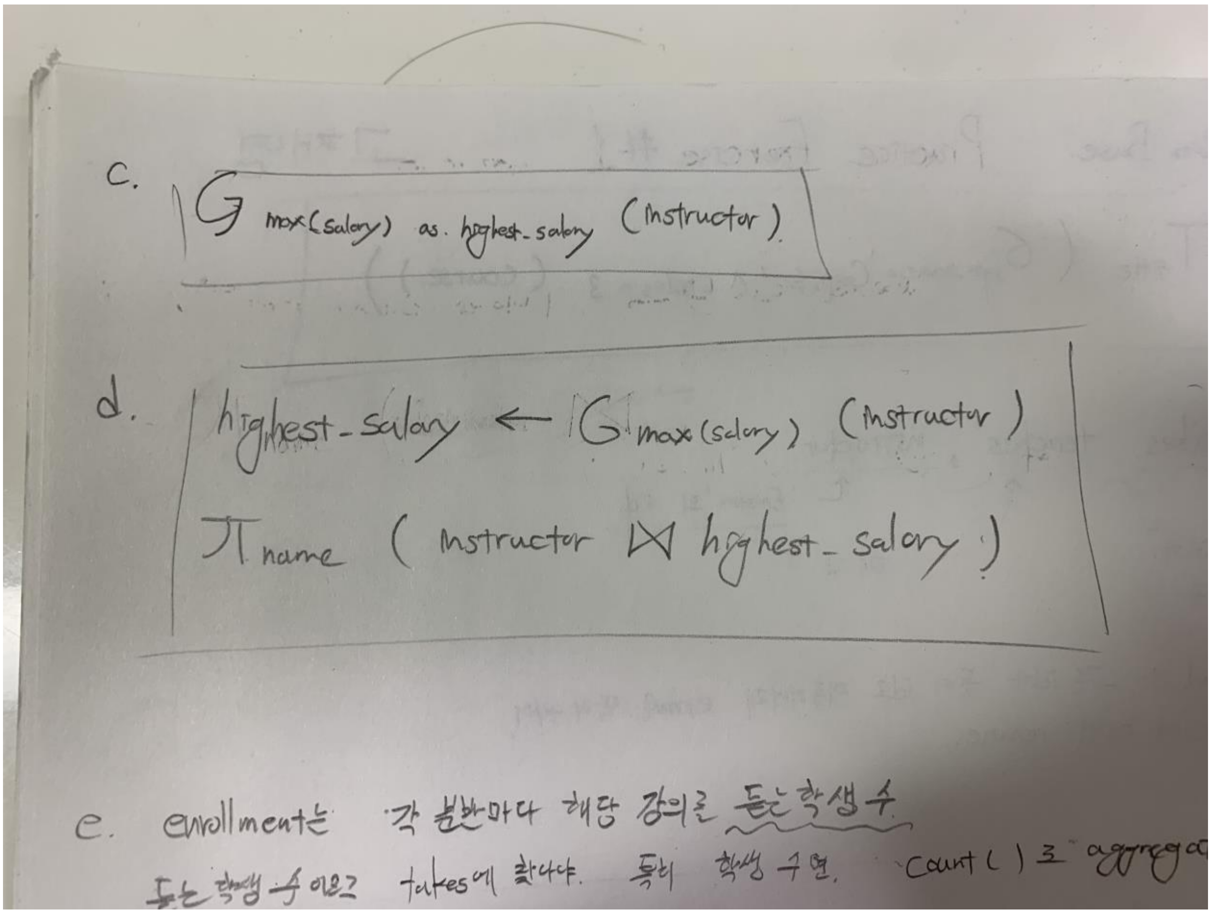
교수 id.

'Enstein'의 id.

학생 id와 교수 id가 둘다 id로 이름지어져 error를 막기 위해, takes에 대해 rename.

$$\Pi_{s\_id} (\sigma_{name='Enstein'} (instructor \bowtie teaches \bowtie \rho_{takes\_sid\,(s\_id,\, course\_id,\, sec\_id,\, semester,\, year,\, grade)}\, takes)$$

c. Find the highest salary of any instructor.



c. $\mathcal{G}_{max(salary)\ as.\ highest\_salary}(instructor)$

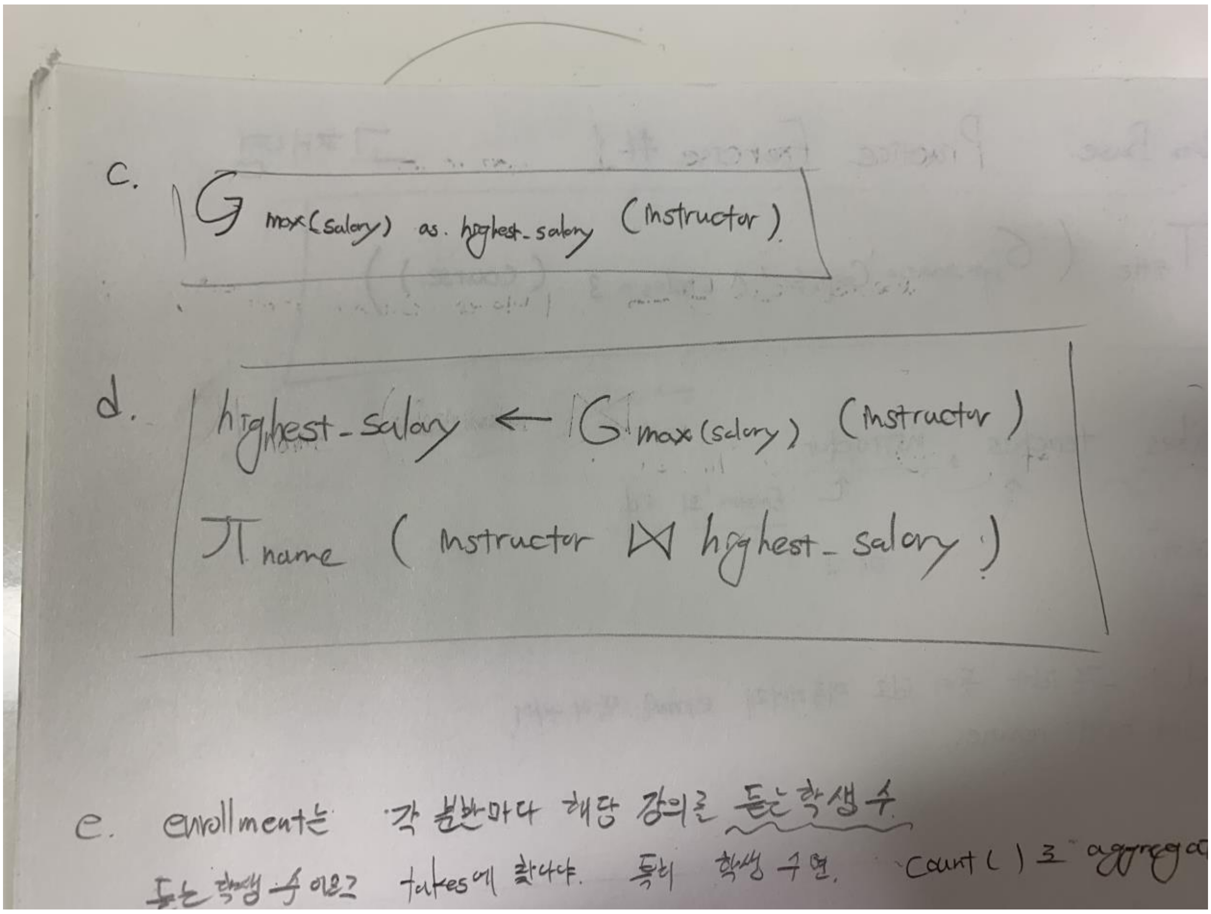
d. $highest\_salary \leftarrow \mathcal{G}_{max(salary)}(instructor)$

$\Pi_{name}(instructor \bowtie highest\_salary)$

e. enrollment는 각 분반마다 해당 강의를 듣는 학생 수

듣는 학생 수 이므로 takes에 찾는다. 특히 학생 수면, count( )로 aggrega

d. Find all instructors earning the highest salary (there may be more than one with the same salary)



c. $\mathcal{G}_{max(salary)\ as.\ highest\_salary}$ (instructor)

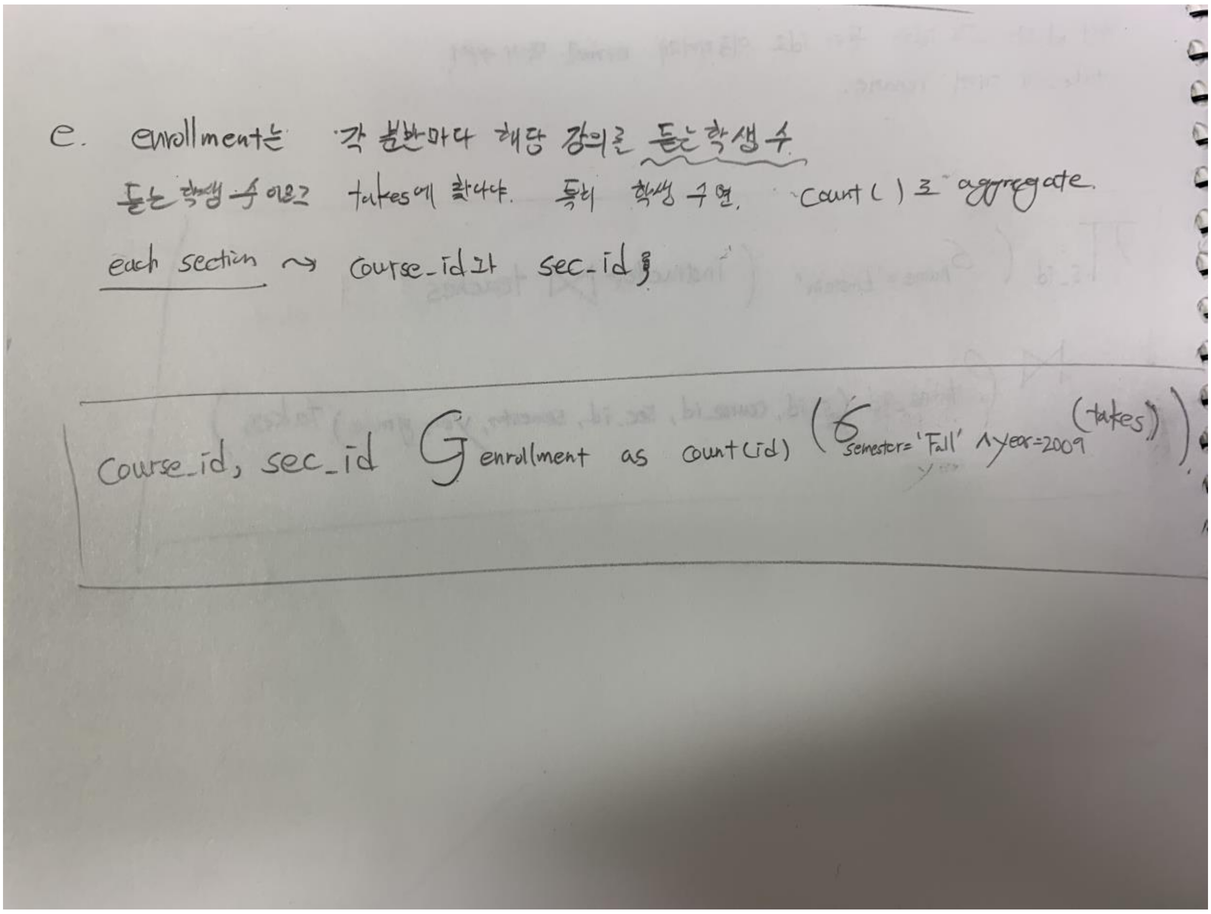
d. highest_salary ← $\mathcal{G}_{max(salary)}$ (instructor)

Π_{name} (instructor ⋈ highest_salary)

e. enrollment는 각 분반마다 해당 강의를 듣는 학생 수

듣는 학생 수이므로 takes에 찾는다. 특히 학생 수면, count( )로 aggrega

e. Find the enrollment of each section that was offered In Fall 2009



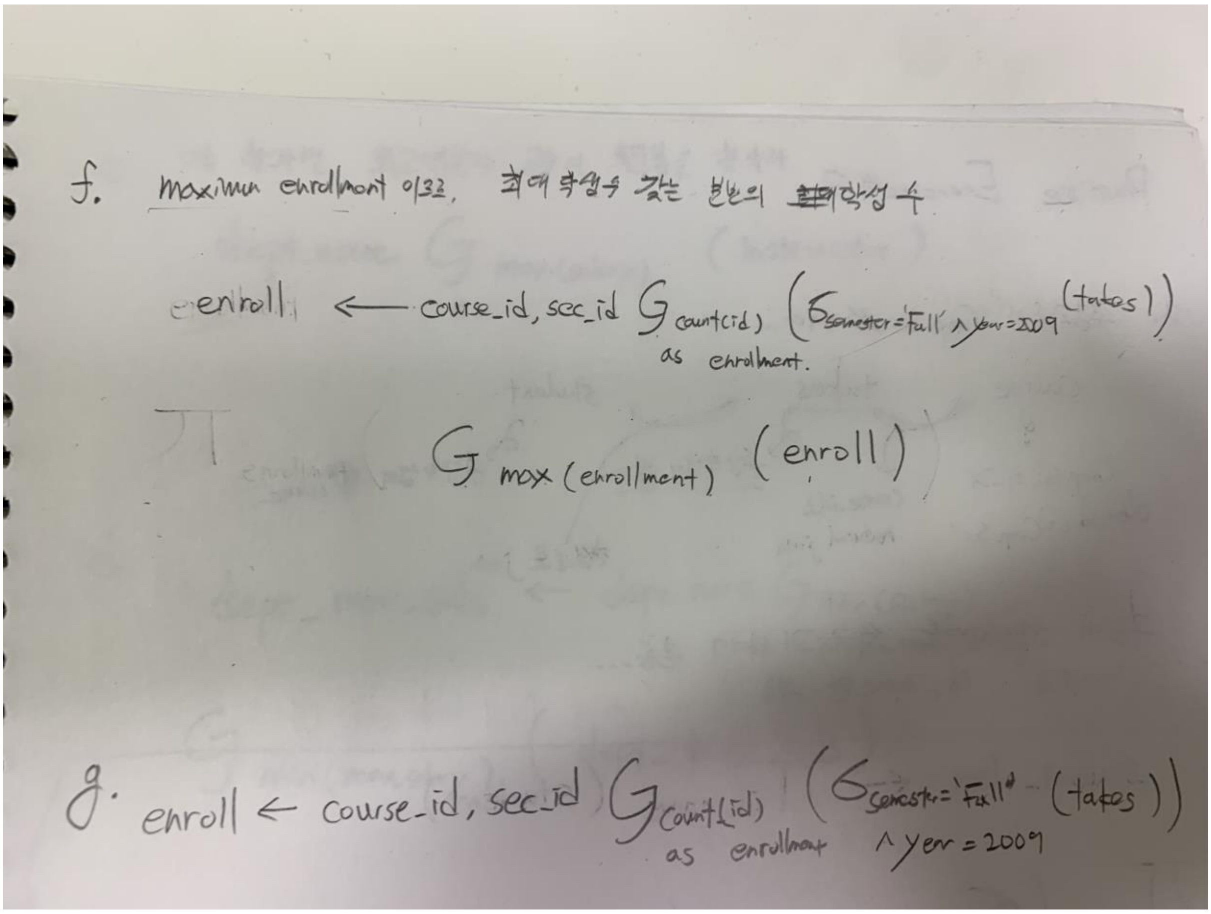
e. enrollment는 각 분반마다 해당 강의를 듣는 학생 수

듣는 학생 수이므로 takes에 찾는다. 특히 학생 수면, count( )로 aggregate.

each section ~> course_id과 sec_id를

$$_{course\_id,\ sec\_id}\mathcal{G}_{enrollment\ as\ count(id)}(\sigma_{semester='Fall' \wedge year=2009}(takes))$$

f. Find the maximum enrollment, across all sections, in Fall 2009



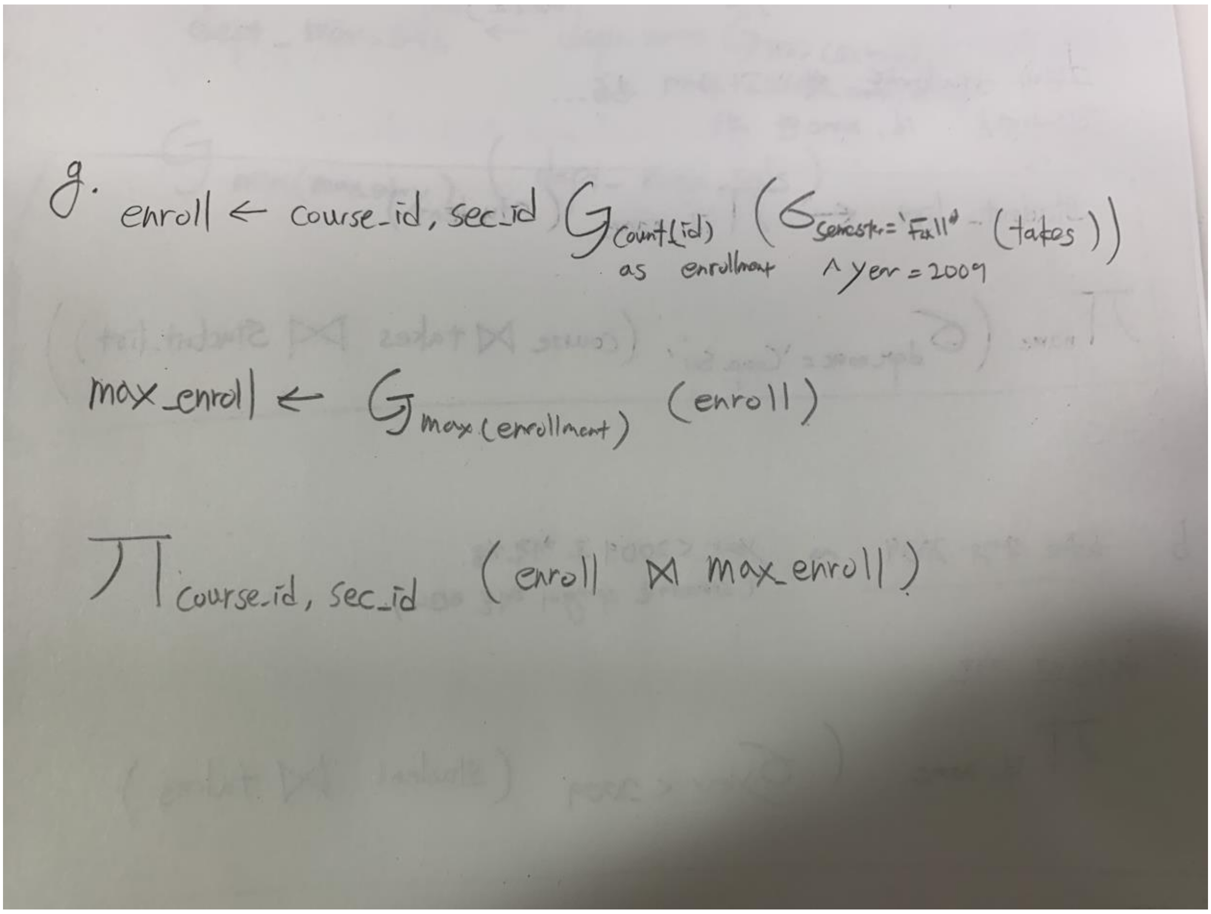
f. maximum enrollment 이므로, 최대 학생수 갖는 분반의 ~~최대~~학생 수.

$enroll \longleftarrow {}_{course\_id,\ sec\_id}\mathcal{G}_{count(id)\ as\ enrollment}(\sigma_{semester='Fall' \wedge year=2009}(takes))$

$\Pi_{enrollment}(\mathcal{G}_{max(enrollment)}(enroll))$

g. $enroll \leftarrow {}_{course\text{-}id,\ sec\_id}\mathcal{G}_{count(id)\ as\ enrollment}(\sigma_{semester='Fall' \wedge yer=2009}(takes))$

g. Find the sections that had the maximum enrollment in Fall 2009



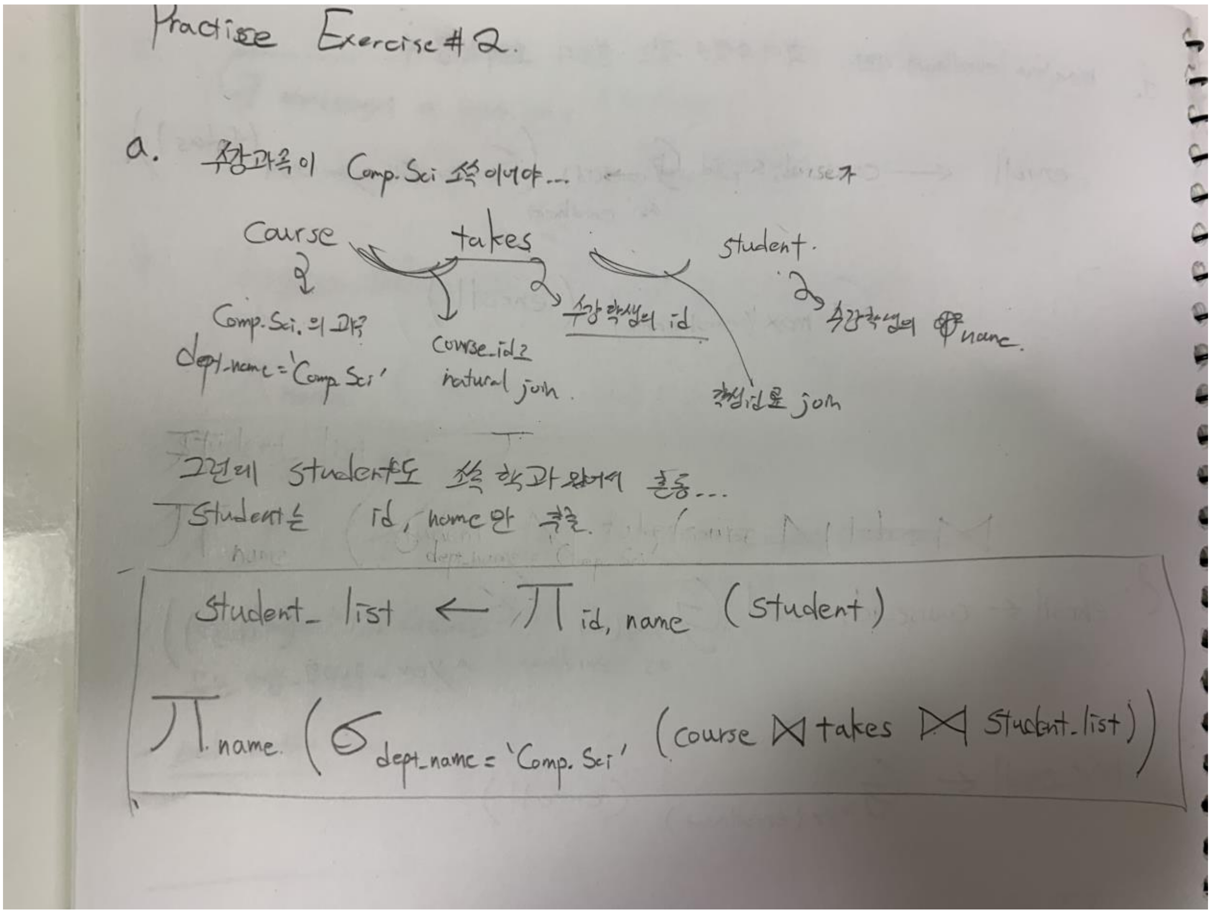
g. $enroll \leftarrow {}_{course\_id,\ sec\_id}\mathcal{G}_{count(id)\ as\ enrollment}(\sigma_{semester='Fall' \wedge year=2009}(takes))$

$max\_enroll \leftarrow \mathcal{G}_{max(enrollment)}(enroll)$

$\Pi_{course\_id,\ sec\_id}(enroll \bowtie max\_enroll)$

Write the following queries in relational algebra, using the university schema

a. Find the names of all students who have taken at least one Comp.Sci. course



Practise Exercise #2.

a. 수강과목이 Comp.Sci 소속이어야...

course → Comp.Sci.의 과목? dept_name='Comp.Sci'

takes → course_id로 natural join

수강 학생의 id

student. → 수강학생의 name.

학생id로 join

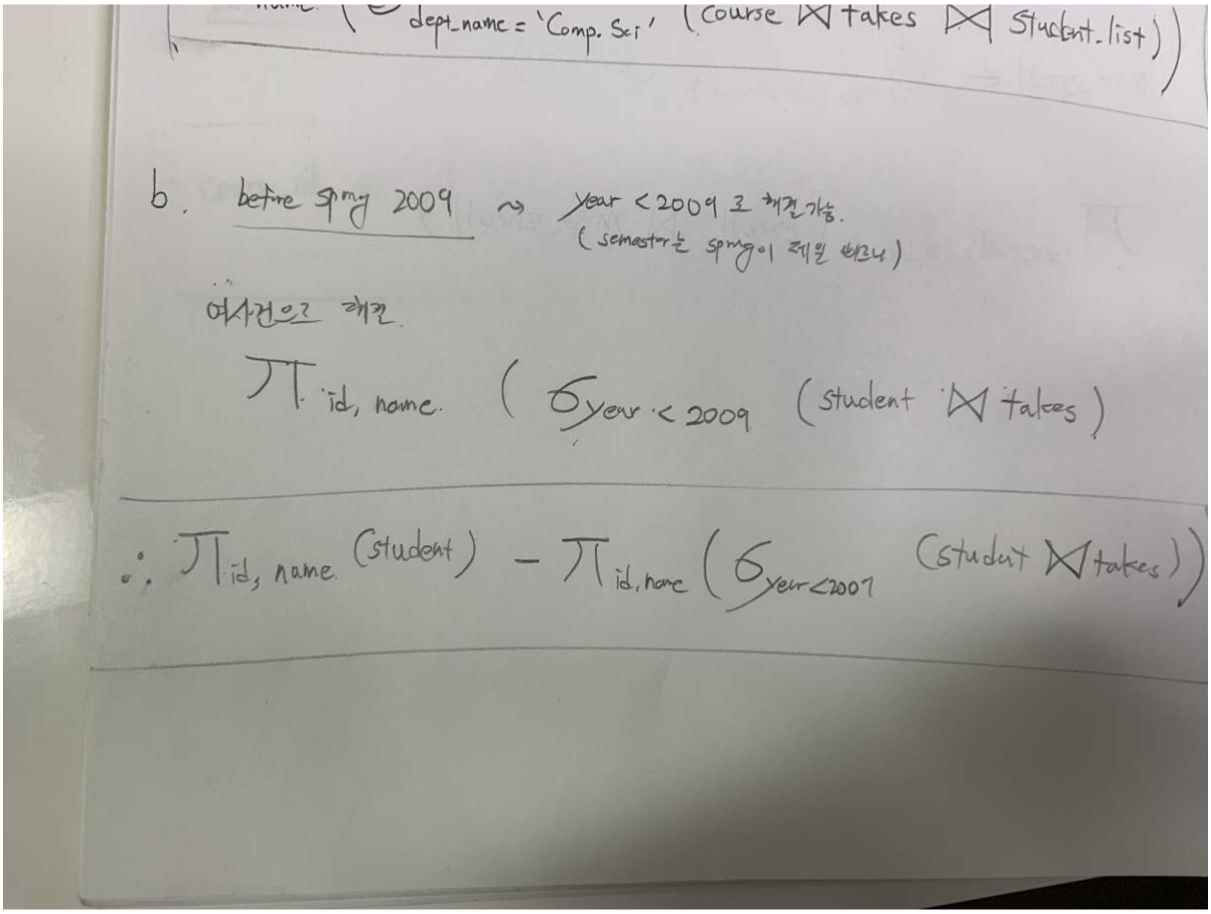
그런데 student에도 소속 학과 있어서 혼동...

Πstudent는 id, name만 추출.

$$\text{student\_list} \leftarrow \Pi_{id,\ name}(\text{student})$$

$$\Pi_{name}(\sigma_{dept\_name='Comp.Sci'}(\text{course} \bowtie \text{takes} \bowtie \text{student\_list}))$$

b. Find the IDs and names of all students who have not taken any course offering before Spring 2009



$name.\ (\sigma_{dept\_name = 'Comp.\ Sci'}\ (course \bowtie takes \bowtie Student.list))$

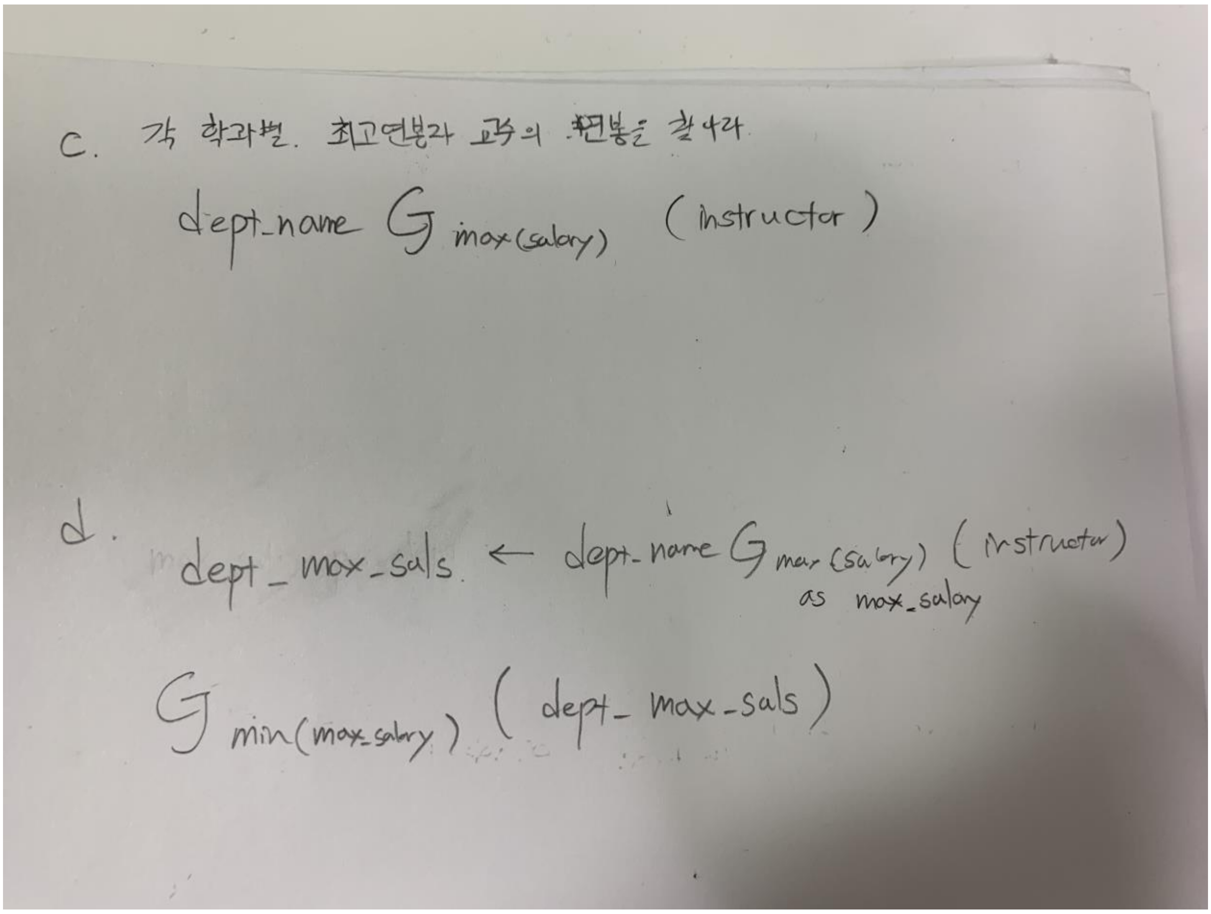
b. before spring 2009 ⇝ year < 2009로 해결가능.
(semester는 spring이 제일 빠르니)

여사건으로 해결.

$\Pi_{id,\ name}\ (\sigma_{year < 2009}\ (student \bowtie takes)$

$\therefore\ \Pi_{id,\ name}\ (student) - \Pi_{id,\ name}\left(\sigma_{year<2007}\ (studnt \bowtie takes)\right)$

c. For each department, find the maximum salary of instructors in that department. You may assume that every department has at least one instructor



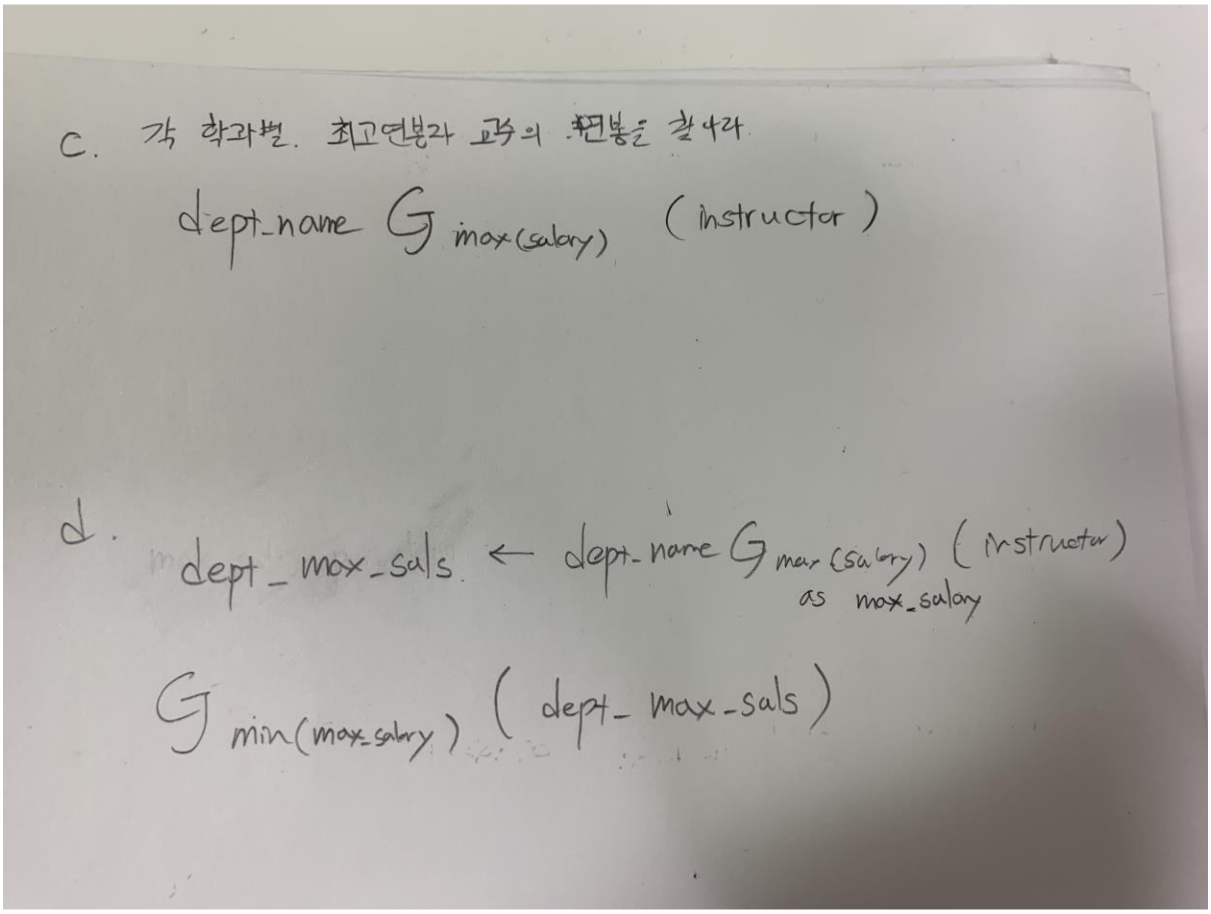
c. 각 학과별. 최고연봉과 교수의 연봉을 출하라.

$$_{dept\_name}\mathcal{G}_{max(salary)}\ (instructor)$$

d. $dept\_max\_sals \leftarrow {}_{dept\_name}\mathcal{G}_{max(salary)\ as\ max\_salary}\ (instructor)$

$$\mathcal{G}_{min(max\_salary)}\ (dept\_max\_sals)$$

d. Find the lowest, across all departments, of the per-department maximum salary computed by the preceding query



c. 각 학과별. 최고연봉과 교수의 연봉을 찾아라.

$_{dept\_name}\mathcal{G}_{max(salary)}(instructor)$

d. $dept\_max\_sals \leftarrow {}_{dept\_name}\mathcal{G}_{\substack{max(salary)\\ as\ max\_salary}}(instructor)$

$\mathcal{G}_{min(max\_salary)}(dept\_max\_sals)$