INFSCI 2710 Database Management, Fall 2018

Homework 2: Relational Algebra, SQL

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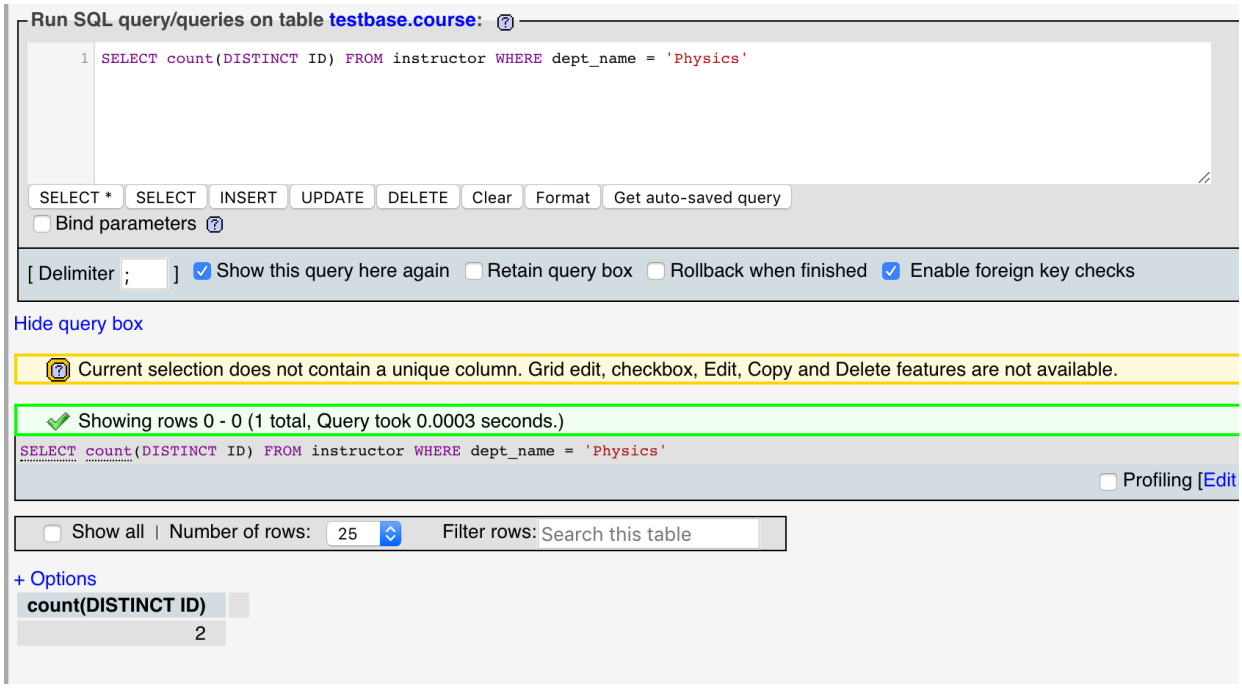
Q1[5pt] Count the number of instructors form Physics department.

Answer:

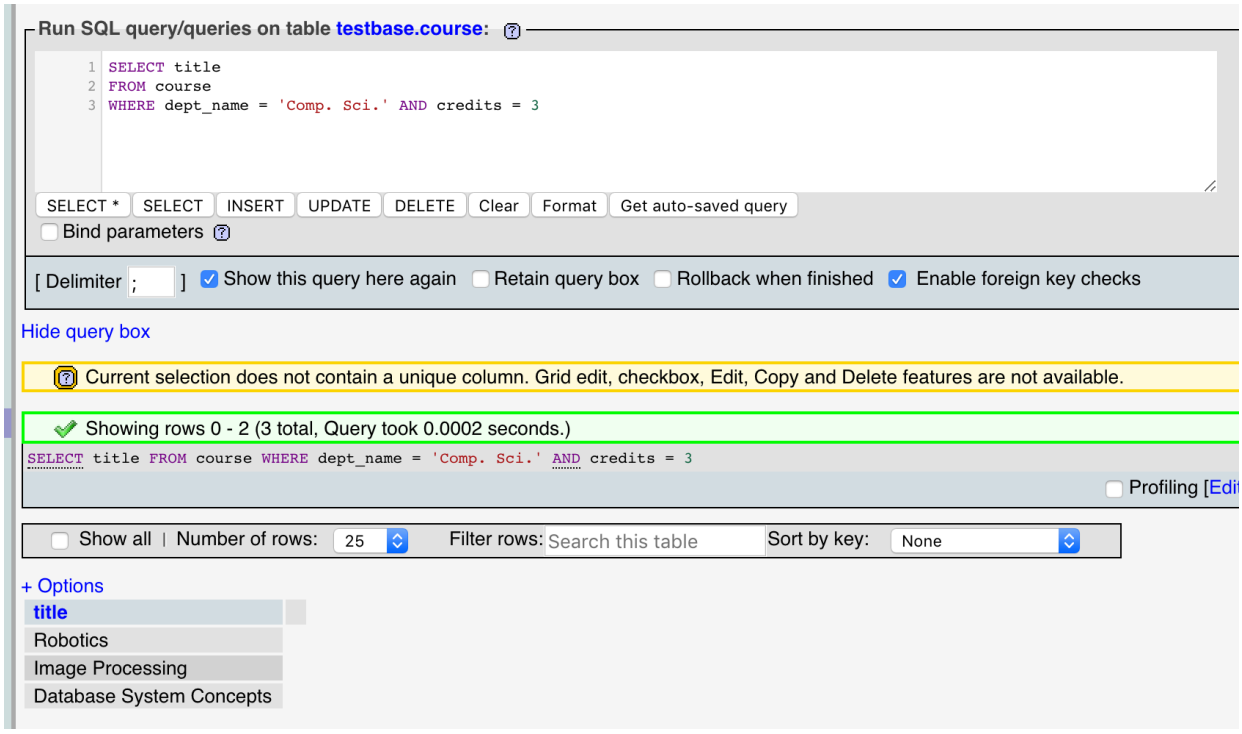
```
SELECT count(DISTINCT ID) FROM instructor WHERE dept_name = 'Physics'
```



Q2[5pt]: Find the names of courses in Computer science department which have 3 credits.

Answer:

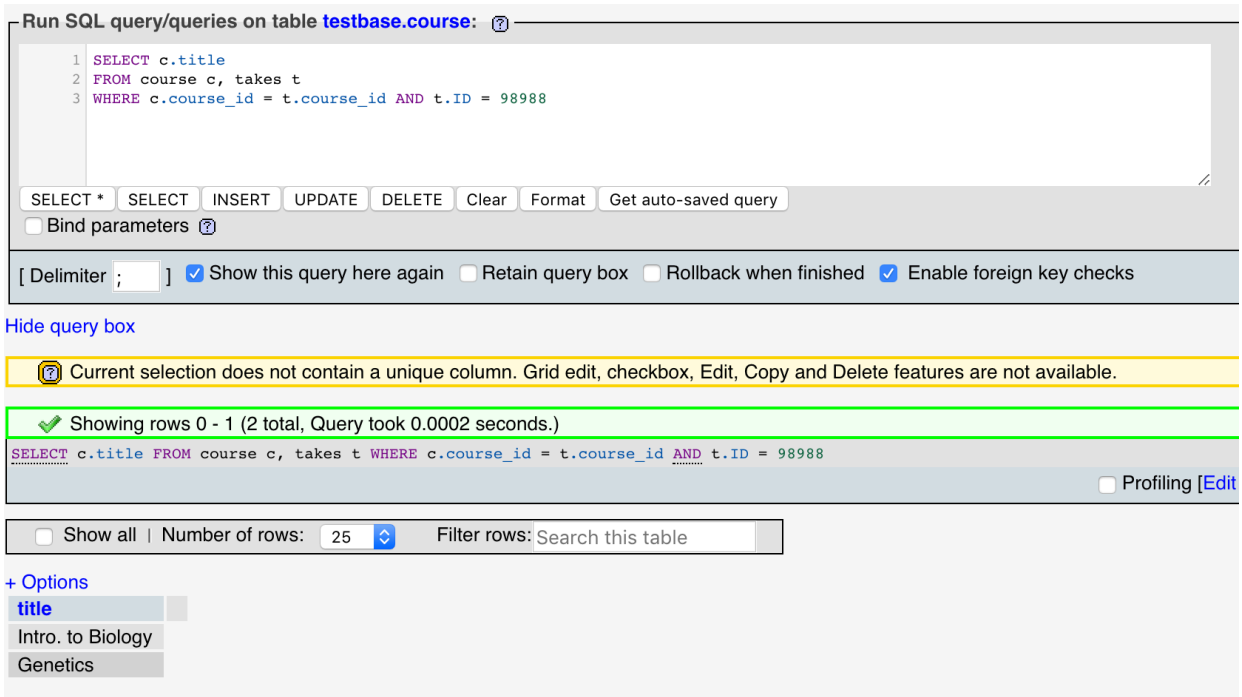
```
SELECT title FROM course WHERE dept_name = 'Comp. Sci.' AND credits = 3
```



Q3[5pt]: Find all the courses's name taken by student 98988

Answer:

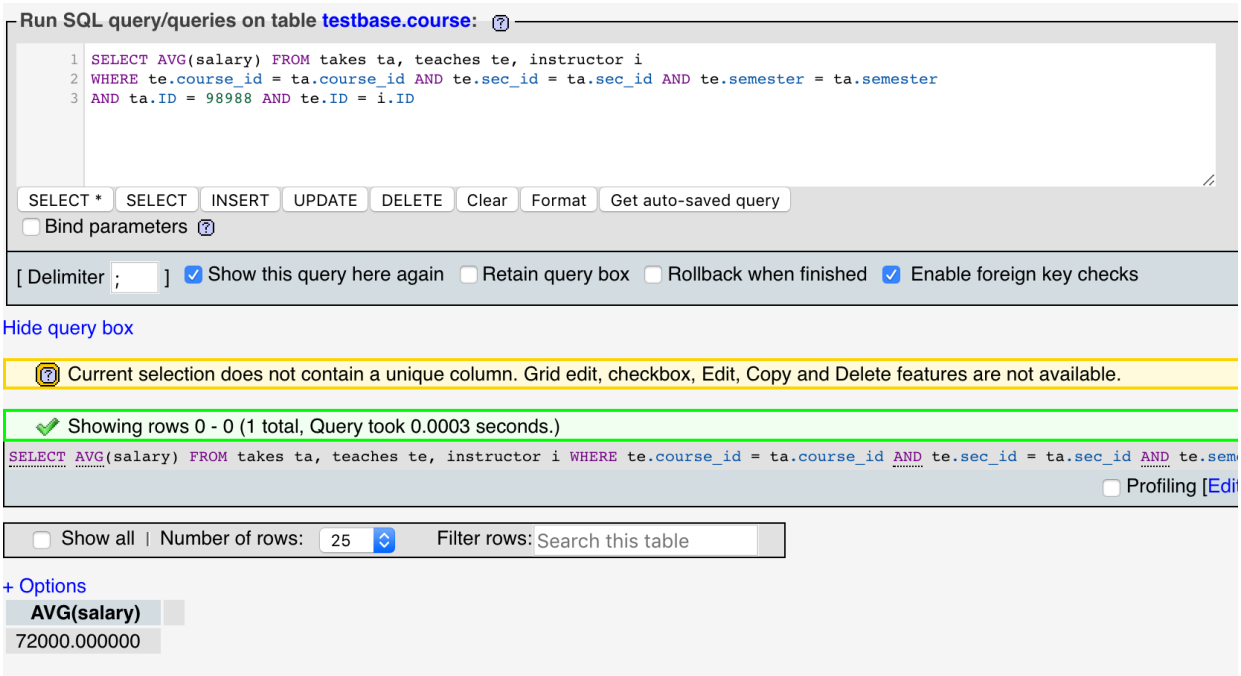
```
SELECT c.title
FROM course c, takes t
WHERE c.course_id = t.course_id AND t.ID = 98988
```



Q4[10pt]: As above but show the average salary of all the instructor of those courses taken by student 98988.

Answer:

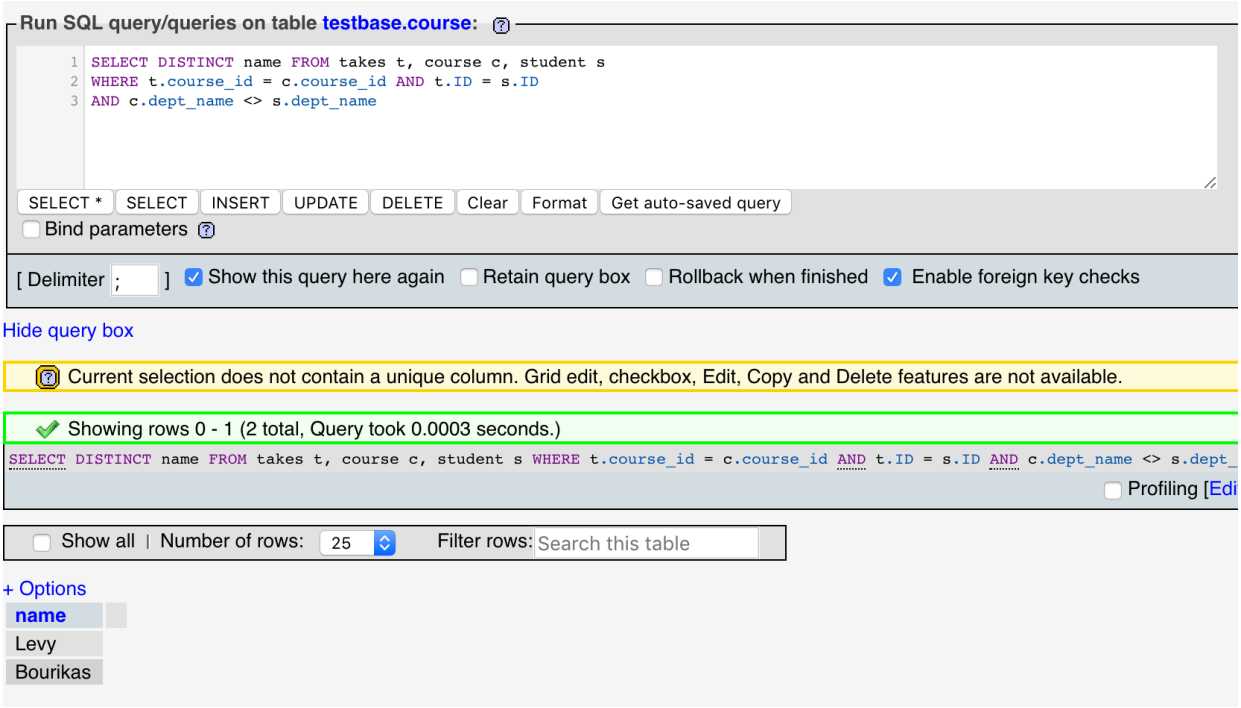
```
SELECT AVG(salary)
FROM takes ta, teaches te, instructor i
WHERE te.course_id = ta.course_id
    AND te.sec_id = ta.sec_id
    AND te.semester = ta.semester
    AND ta.ID = 98988 AND te.ID = i.ID
```



Q5[10pt]: Find the students' name who take the course in the different department as the student.

Answer:

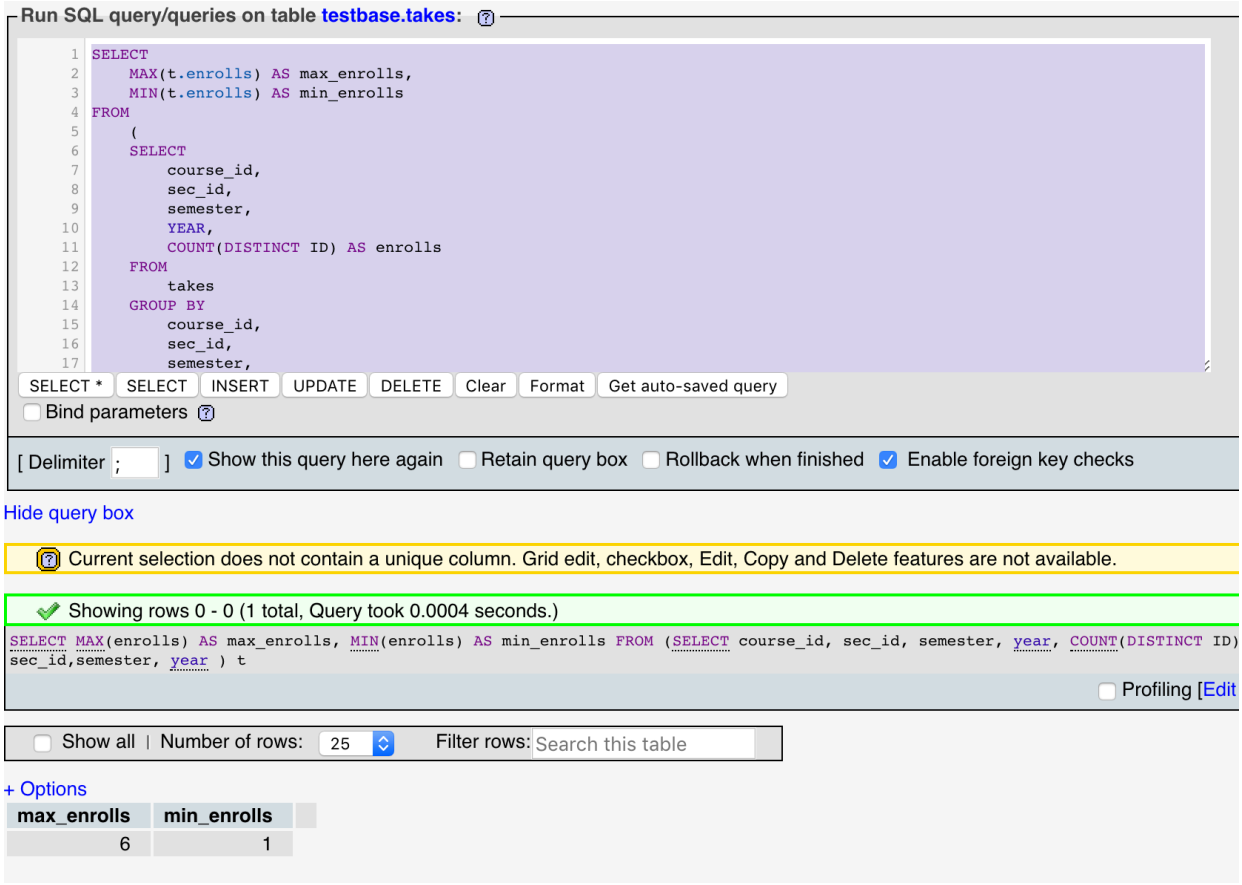
```
SELECT DISTINCT name
FROM takes t, course c, student s
WHERE t.course_id = c.course_id
    AND t.ID = s.ID
    AND c.dept_name <> s.dept_name
```



Q6[10pt]: Find the maximum and minimum enrollment across all sections, considering only sections that had some enrollment, don't worry about those that had no students taking that section.

Answer:

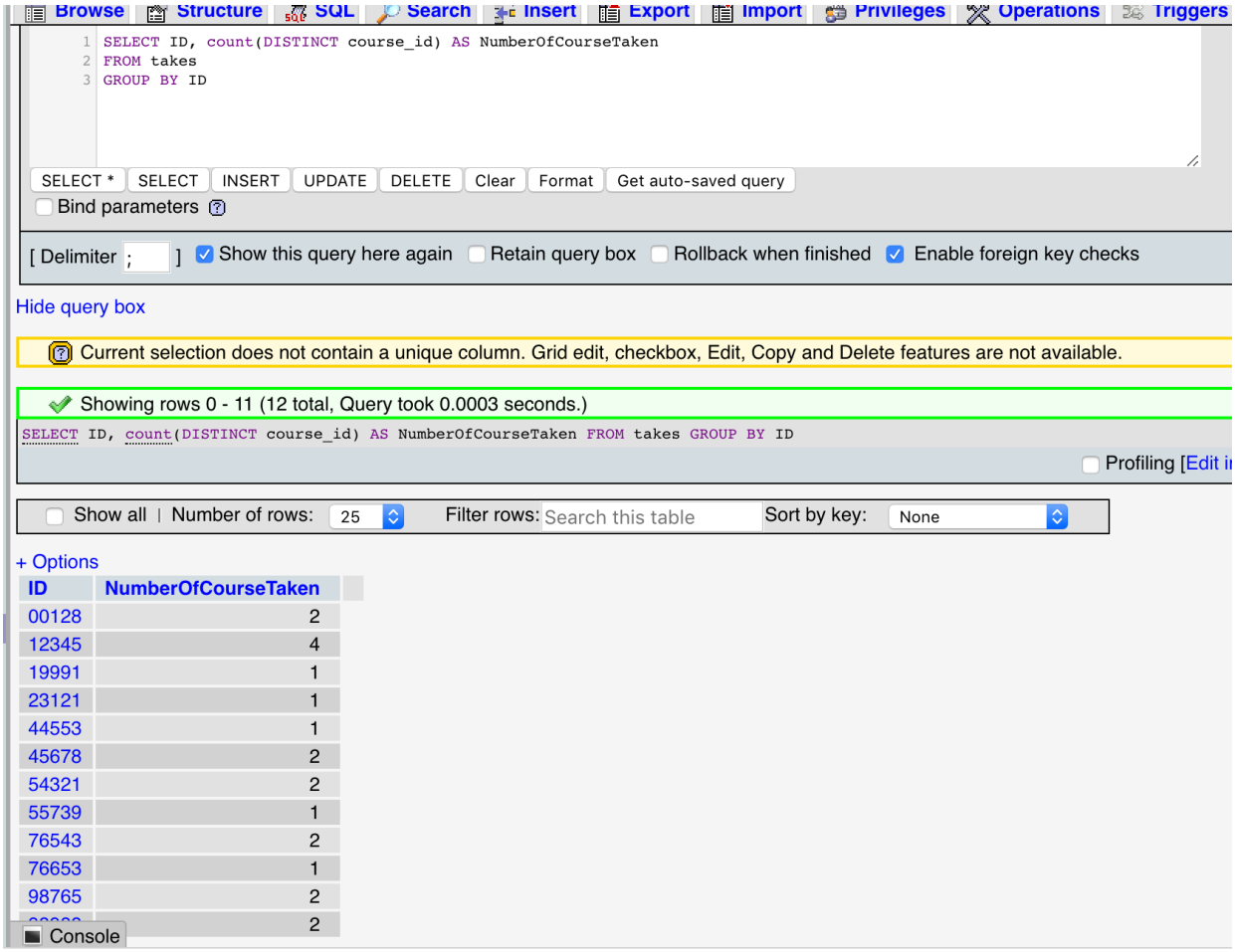
```
SELECT
    MAX(t.enrolls) AS max_enrolls, MIN(t.enrolls) AS min_enrolls
FROM
(
    SELECT course_id,sec_id,semester,year,COUNT(DISTINCT ID) AS enrolls
    FROM takes
    GROUP BY course_id,sec_id,semester,year
) t
```



Q7[5pt]: Find each student ID and the count of courses he/she takes. Display the student ID and course count.

Answer:

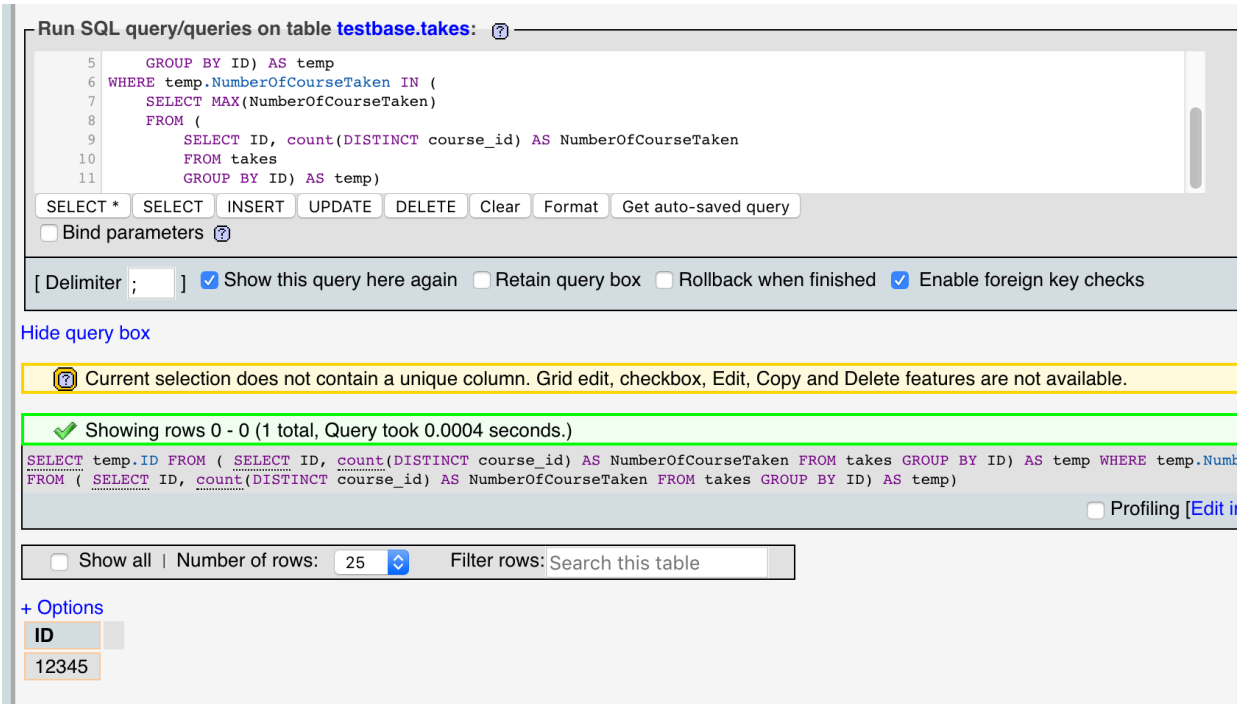
```
SELECT
ID,count(DISTINCT course_id) AS NumberOfCourseTaken
FROM takes
GROUP BY ID
```



Q8[10pt]: Find the student who take more courses than the other students. Display the student ID and course count.

Answer:

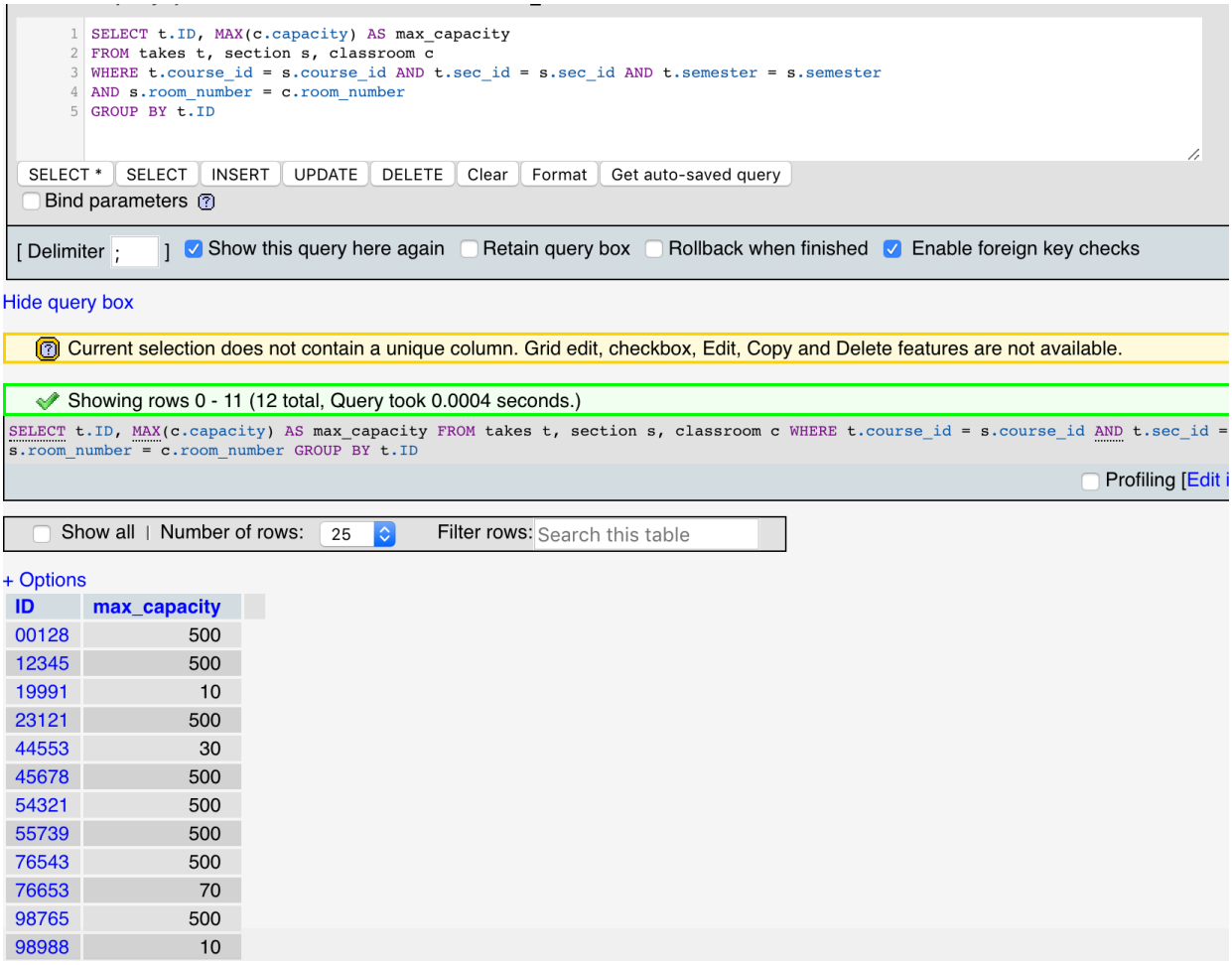
```
SELECT
    temp.ID
FROM
(
    SELECT
        ID,COUNT(DISTINCT course_id) AS NumberOfCourseTaken
    FROM takes
    GROUP BY ID
) AS temp
WHERE temp.NumberOfCourseTaken IN (
    SELECT MAX(NumberOfCourseTaken)
    FROM
    (
        SELECT ID,COUNT(DISTINCT course_id) AS NumberOfCourseTaken
        FROM takes
        GROUP BY ID
    ) AS temp
)
```



Q9[10pt]: Find the student and the largest classroom (biggest room capacity) among all the class he/she has taken. Display the student ID and the room capacity.

Answer:

```
SELECT
    t.ID, MAX(c.capacity) AS max_capacity
FROM takes t, section s, classroom c
WHERE t.course_id = s.course_id
    AND t.sec_id = s.sec_id
    AND t.semester = s.semester
    AND s.room_number = c.room_number
GROUP BY t.ID
```



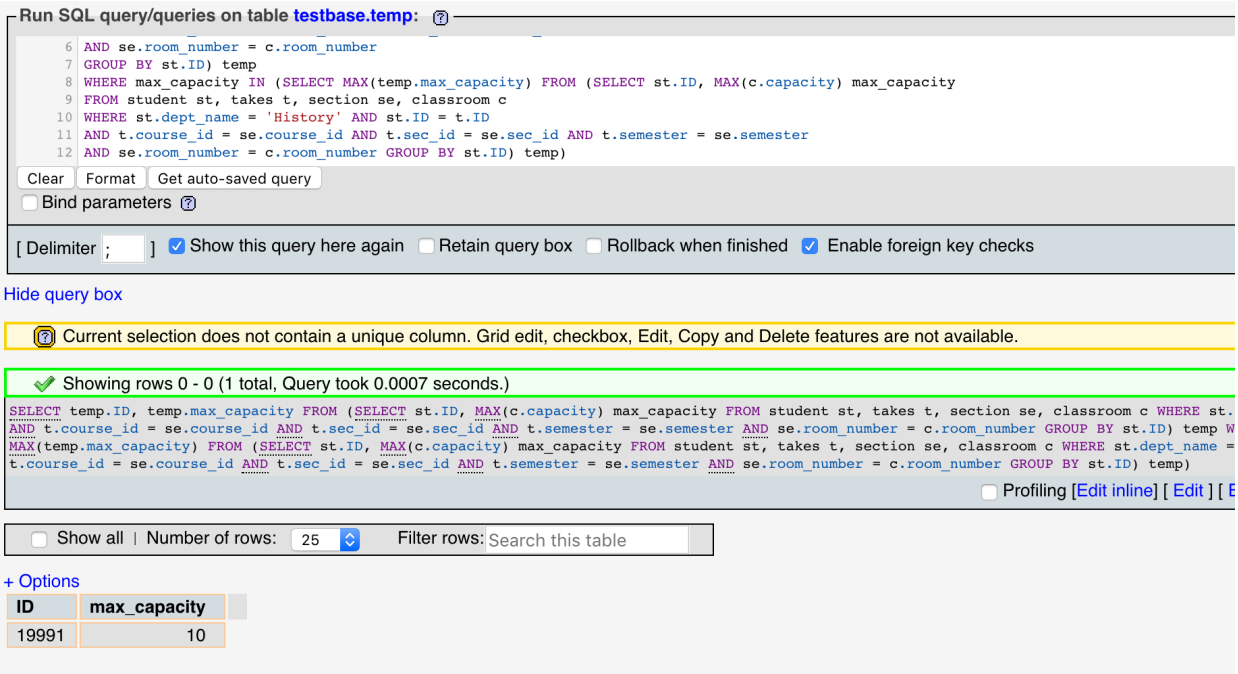
ID	max_capacity
00128	500
12345	500
19991	10
23121	500
44553	30
45678	500
54321	500
55739	500
76543	500
76653	70
98765	500
98988	10

Q10[15pt]: Find the student (ID) from history department who has taken classes in the largest classroom (biggest the room capacity) compare with other students in history department. Display the student ID and the corresponding room capacity.

Answer:

```
SELECT
    temp.ID, temp.max_capacity
FROM
    (
    SELECT st.ID, MAX(c.capacity) max_capacity
    FROM student st, takes t, section se, classroom c
    WHERE st.dept_name = 'History'
        AND st.ID = t.ID
        AND t.course_id = se.course_id
        AND t.sec_id = se.sec_id
        AND t.semester = se.semester
        AND se.room_number = c.room_number
    GROUP BY st.ID
) temp
WHERE max_capacity IN(
    SELECT
        MAX(temp.max_capacity)
    FROM
        (
```

```
            SELECT st.ID, MAX(c.capacity) max_capacity
            FROM student st, takes t, section se, classroom c
            WHERE st.dept_name = 'History'
                AND st.ID = t.ID
                AND t.course_id = se.course_id
                AND t.sec_id = se.sec_id
                AND t.semester = se.semester
                AND se.room_number = c.room_number
            GROUP BY st.ID
        ) temp
    )
```

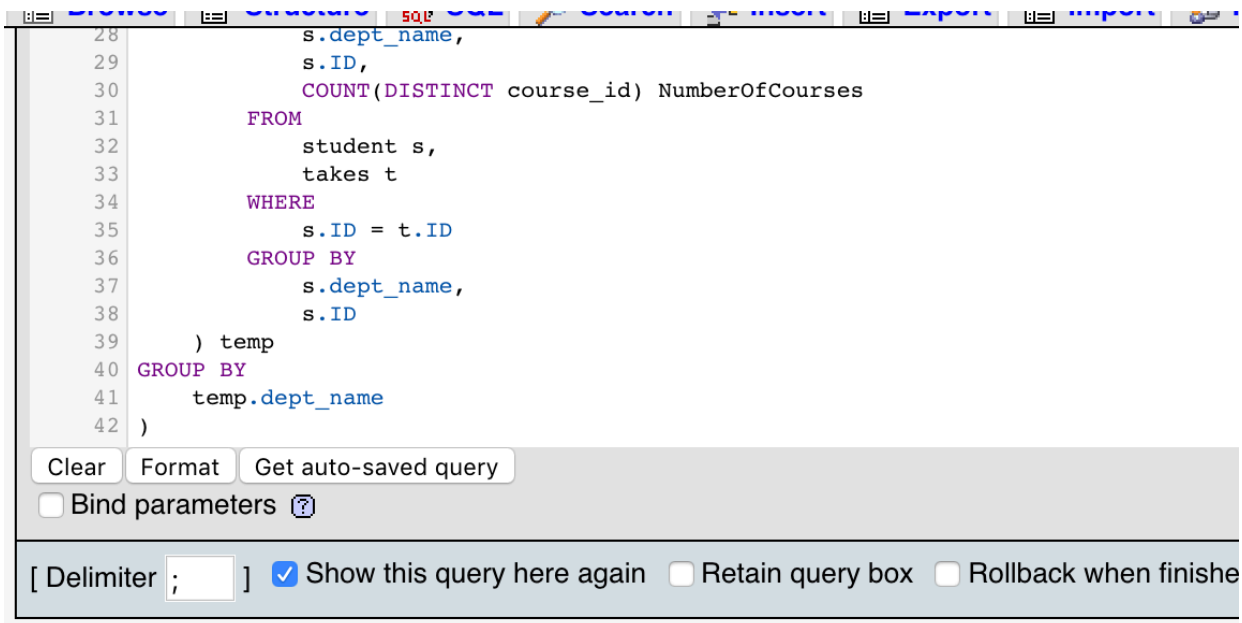


Q11[15pt]: Find the department that its students take more courses on average than other departments. Display the department, and average count of courses that its student take.

Answer:

```
SELECT
    temp.dept_name, AVG(temp.NumberOfCourses) avgcourses
FROM
(
    SELECT s.dept_name,s.ID,COUNT(DISTINCT course_id) NumberOfCourses
    FROM student s, takes t
    WHERE s.ID = t.ID
    GROUP BY s.dept_name, s.ID
) temp
GROUP BY temp.dept_name
HAVING AVG(temp.NumberOfCourses) >= ALL(
    SELECT AVG(temp.NumberOfCourses) avgcourses
    FROM
    (
        SELECT s.dept_name, s.ID,
```

```
                COUNT(DISTINCT course_id) NumberOfCourses
        FROM student s, takes t
        WHERE s.ID = t.ID
        GROUP BY s.dept_name, s.ID
    ) temp
GROUP BY
    temp.dept_name
)
```



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```
SELECT temp.dept_name, AVG(temp.NumberOfCourses) avgcourses FROM ( SELECT s.dept_name, s.
BY s.dept_name, s.ID ) temp GROUP BY temp.dept_name HAVING AVG(temp.NumberOfCourses) >= A
course_id) NumberOfCourses FROM student s, takes t WHERE s.ID = t.ID GROUP BY s.dept_name
```

Show all | Number of rows: 25 Filter rows: Search this table

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dept_name	avgcourses
Comp. Sci.	2.5000