Laith Alebrahim SD-01

Lab 5 :

1- Find the maximum and minimum enrolment across all sections, considering only sections that had some enrolment, don't worry about those that had no students taking that section:
Sol:

```
SELECT MAX(enrollment) as MAX_enrol, MIN(enrollment) as MIN_enrol
FROM (
   SELECT COUNT(*) as enrollment
   FROM takes
   GROUP BY course_id, sec_id, semester, year
   HAVING COUNT(*) > 0
) as enrol_count;
```

2. Find all sections that had the maximum enrolment (along with the enrolment), using a subquery.

Sol:

```
SELECT course_id, sec_id, semester, year, COUNT(*) as enrol
FROM takes
GROUP BY course_id, sec_id, semester, year
HAVING COUNT(*) = (
   SELECT MAX(enrol)
   FROM (
      SELECT COUNT(*) as enrol
      FROM takes
      GROUP BY course_id, sec_id, semester, year
      HAVING COUNT(*) > 0
   ) as enrol_count
)
```

3. Modify 1 to include sections with no students taking them; the enrolment for such sections should be treated as 0. Do this in two different ways (and create require data for testing)

a) Using a scalar subquery

Sol:

```
SELECT MAX(enrollment) as MAX_enrol, MIN(enrollment) as MIN_enrol
FROM (
   SELECT
      (SELECT COUNT(*) FROM takes t WHERE s.course_id=t.course_id AND
s.sec_id=t.sec_id AND s.semester=t.semester AND s.year=t.year) as enrollment
   FROM section s
) as enrol_count;
```

b) Using aggregation on a left outer join (use the SQL natural left outer join syntax)

Sol:

```
SELECT MAX(COALESCE(enrollment, 0)) as MAX_enrol,
MIN(COALESCE(enrollment, 0)) as MIN_enrol
FROM (
   SELECT s.course_id, s.sec_id, s.semester, s.year, COUNT(t.ID) as enrollment
   FROM section s LEFT JOIN takes t ON s.course_id=t.course_id AND
s.sec_id=t.sec_id AND s.semester=t.semester AND s.year=t.year
   GROUP BY s.course_id, s.sec_id, s.semester, s.year
) as enrol_count;
```

4. Find all courses whose identifier starts with the string "CS-1"

Sol:

```
SELECT * FROM course WHERE course_id LIKE 'CS-1%';
```

5. Find the names of all the instructors from Biology department

Sol:

```
SELECT name FROM instructor WHERE dept_name='Biology';
```

6. Find the enrollment of each section that was offered in Autumn 2022.

Sol:

```
SELECT course_id, sec_id, COUNT(*) as enrol
FROM takes
WHERE semester='Fall' AND year=2022
GROUP BY course_id, sec_id;
```

7. Find the maximum enrollment, across all sections, in Autumn 2022.

Sol:

```
SELECT MAX(enrollment) as MAX_enrol
FROM (
   SELECT COUNT(*) as enrollment
   FROM takes
   WHERE semester='Fall' AND year=2022
   GROUP BY course_id, sec_id
) as enrol_count;
```