```sql
-- Name: Chuong Vu

/* Queries tables
course (course_id, title, dept_name, credits)
instructor (ID, name, dept_name, salary)
teaches (ID, course_id, sec_id, semester, year)
student (ID, name, dept_name, tot_cred)
takes (ID, course_id, sec_id, semester, year, grade)

*/

/* Pre-setup display for easy to look */
clear break
clear comp
clear col
SET HEADING ON
SET PAGESIZE 30
set linesize 9999
set trimspool ON
set tab off
set echo off
set recsep off


-- 1. Find the student's name whose ID = "113". */

SELECT name
FROM student
WHERE id='113';

-- 2. List all courses which title starts with "G"

SELECT *
FROM course
WHERE title
LIKE 'G%';

-- 3. List all instructor IDs who did not teach any courses in Fall 2016.
-- SELECT DISTINCT * FROM INSTRUCTOR NATURAL JOIN TEACHES WHERE SEMESTER!='Fall' AND YEAR!='2016' ORDER BY ID;

SELECT id
FROM instructor
WHERE id
NOT IN (SELECT id
        FROM teaches
        WHERE semester='fall'
        AND year=2016);

-- 4. Find the total number of students in each department. Display the number in ascending order.
SELECT DEPT_NAME, COUNT(DEPT_NAME) CNT
FROM student
GROUP BY dept_name
ORDER BY CNT ASC;

-- 5. Find the name of instructor who teaches the most students.
-- Shortest Method

SELECT instructor.id, instructor.name
FROM instructor,
    (SELECT teaches.id
    FROM teaches INNER JOIN takes
    ON takes.course_id = teaches.course_id AND takes.sec_id = teaches.sec_id AND takes.semester = teaches.semester AND takes.year = teaches.year
    GROUP BY teaches.id
    HAVING COUNT(teaches.id) =
        (SELECT MAX(COUNT(teaches.id))
        FROM teaches INNER JOIN takes
        ON takes.course_id = teaches.course_id AND takes.sec_id = teaches.sec_id AND takes.semester = teaches.semester AND takes.year = teaches.year
        GROUP BY teaches.id)
    ) idtable
WHERE instructor.id = idtable.id;


/*
-- new method
SELECT ins.id, ins.name
FROM instructor ins,
    (SELECT t1.id, COUNT(t1.id)
    FROM (SELECT teaches.id id, takes.id studentid, takes.course_id, takes.sec_id, takes.semester, takes.year
        FROM teaches INNER JOIN takes
        ON takes.course_id = teaches.course_id AND takes.sec_id = teaches.sec_id AND takes.semester = teaches.semester AND takes.year = teaches.year
        ORDER BY takes.year) t1
    GROUP BY id
    HAVING COUNT(t1.id) =
        (SELECT MAX(COUNT(teachid))
        FROM (SELECT teaches.id teachid, takes.id studentid, takes.course_id, takes.sec_id, takes.semester, takes.year
            FROM teaches INNER JOIN takes
            ON takes.course_id = teaches.course_id AND takes.sec_id = teaches.sec_id AND takes.semester = teaches.semester AND takes.year = teaches.year
            ORDER BY takes.year)
        GROUP BY teachid)
    ) rs
WHERE ins.id = rs.id;

*/

-- Method 2, use more select
/*
SELECT ins.id, ins.name FROM instructor ins,
    (SELECT t2.teachid, t1.cnt
    FROM (SELECT max(cnt) cnt
        FROM (SELECT id, count(*) cnt
            FROM (SELECT teaches.id id, takes.id studentid, takes.course_id, takes.sec_id, takes.semester, takes.year
                FROM teaches INNER JOIN takes
                ON takes.course_id = teaches.course_id AND takes.sec_id = teaches.sec_id AND takes.semester = teaches.semester AND takes.year = teaches.year
                ORDER BY takes.year)
            GROUP BY id)
        ) t1,
        (SELECT id teachid, cnt
        FROM (SELECT id, count(*) cnt
            FROM (SELECT teaches.id id, takes.id studentid, takes.course_id, takes.sec_id, takes.semester, takes.year
                FROM teaches INNER JOIN takes
                ON takes.course_id = teaches.course_id AND takes.sec_id = teaches.sec_id AND takes.semester = teaches.semester AND takes.year = teaches.year
                ORDER BY takes.year)
            GROUP BY id)
        ) t2
    WHERE t1.cnt = t2.cnt) rs
WHERE rs.teachid = ins.id;

*/

-- 6. List all instructors who teach in all those years that the instructor "McKinnon" teaches.
-- I remove the name of McKinnon in the list

SELECT teaches.id, instructor.name
FROM teaches INNER JOIN instructor
ON teaches.id = instructor.id
WHERE teaches.year IN
    (SELECT DISTINCT t.year
    FROM teaches t, instructor i
    WHERE i.name='McKinnon' AND t.id=i.id) AND instructor.name != 'McKinnon'
GROUP BY teaches.id, instructor.name
ORDER BY teaches.id;

-- 7. For the department WHERE the instructors have the highest average salary, list the top 2 instructors who have the highest salaries AND their salaries.

-- new method
SELECT name, salary
FROM instructor
WHERE dept_name =
    (SELECT t1.dept_name
    FROM instructor t1
    GROUP BY t1.dept_name
    HAVING AVG(t1.salary) >=
        (SELECT MAX(AVG(salary))
        FROM instructor
        GROUP BY dept_name))
AND ROWNUM <=
ORDER BY salary DESC;


/*
Old method

SELECT name, salary
FROM instructor
WHERE dept_name =
    (SELECT t2.dept_name
    FROM (SELECT max(avg(salary)) max
        FROM instructor
        GROUP BY dept_name) t1,
    (SELECT dept_name, avg(salary) avg_salary
        FROM instructor
        GROUP BY dept_name) t2
    WHERE t1.max = t2.avg_salary)
AND rownum <=2
ORDER BY salary DESC;

*/

-- 8. Generate "transcript records" for all students of "Comp. Sci." department. A transcript record should include student name, course title, the year and semester when the student took this course, the credits of this course and the grade of the student on this course. The transcript records from one student should be shown together, and in year, semester descending order. Return only 5 of those transcript records.

WITH st AS
 (SELECT  id, name
  FROM (SELECT *
        FROM student
        WHERE dept_name='Comp. Sci.'
        ORDER BY name)
   WHERE ROWNUM <=5)
SELECT st.name, course.title, takes.semester, takes.year, takes.grade, course.credits
FROM st, takes INNER JOIN course
ON course.course_id=takes.course_id
WHERE takes.id=st.id
ORDER BY name;


-- 9. Increase the salary of instructors whose salary <= 50000 by 10000.

UPDATE instructor
SET salary = salary + 10000
WHERE salary <= 50000;

-- 10. Delete all the records in table "takes" which students' name = "Tomason".

DELETE FROM takes
WHERE id
IN (SELECT id
    FROM student
    WHERE name='Tomason');
```