CS143: Homework #3 (Advanced SQL)

1.
```
SELECT Avg(salary)
FROM   instructor;
```

2.
```
SELECT dept,
       Max(credits)
FROM   class C
GROUP  BY dept
```

3.
```
SELECT dept
FROM   class C
GROUP  BY dept
HAVING Count(*) >= 3;
```

4.
```
(SELECT dept
 FROM   department)
EXCEPT
(SELECT dept
 FROM   class
 WHERE  credits <> 3);
```

5.
```
SELECT Avg(credits)
FROM   class
WHERE  dept = 'Comp. Sci.';
```

6.
```
SELECT dept,
       Avg(credits)
FROM   class
GROUP  BY dept;
```

7.
```
SELECT DISTINCT dept,
                Avg(credits)
                  OVER(
                    partition BY dept),
                Avg(credits)
                  OVER()
FROM   class;
```

8.
```
SELECT DISTINCT dept,
                Avg(salary)
                  OVER() - Avg(salary)
                           OVER(
                             partition BY dept)
FROM   instructor;
```

9.
```
SELECT dept,
       CASE
         WHEN ( dept = 'Comp. Sci.'
                OR dept = 'Elec. Eng.' ) THEN 'Engineering'
         ELSE 'L&S'
       end school
FROM   department;
```

10.
```
WITH school
     AS (SELECT dept,
                CASE
                  WHEN ( dept = 'Comp. Sci.'
                         OR dept = 'Elec. Eng.' ) THEN 'Engineering'
                  ELSE 'L&S'
                END school
         FROM   department)
SELECT school,
       Count(DISTINCT S.id),
       Count(DISTINCT I.id)
FROM   school,
       student S,
       instructor I
WHERE  S.dept = school.dept
       AND S.dept = I.dept
GROUP  BY school;
```

11.
```
SELECT T9.stud_id
FROM   (SELECT stud_id,
               Count(*) count
        FROM   takes
        WHERE  year = 2009
        GROUP  BY stud_id) T9
       LEFT OUTER JOIN (SELECT stud_id,
                               Count(*) count
                        FROM   takes
                        WHERE  year = 2010
                        GROUP  BY stud_id) T10
                    ON T9.stud_id = T10.stud_id
WHERE  T9.count > T10.count
        OR T10.stud_id IS NULL;
```

12.
```
WITH credits
     AS (SELECT stud_id,
                year,
                Sum(credits) credits
         FROM   takes,
                class
         WHERE  class_id = id
         GROUP  BY stud_id,
                   year)
SELECT C.stud_id,
       C.year
FROM   credits C,
       (SELECT stud_id,
               Max(credits) credits
        FROM   credits
        GROUP  BY stud_id) MC
```

```
WHERE C.stud_id = MC.stud_id
      AND C.credits = MC.credits;
```

13.
```
SELECT stud_id
FROM   takes T,
       class C
WHERE T.class_id = C.id
GROUP BY stud_id
ORDER BY Sum(credits) DESC
LIMIT 4;
```

14.
```
SELECT S.name,
       I.name
FROM   (student S
        LEFT JOIN advisor A
               ON S.id = A.stud_id)
       LEFT JOIN instructor I
              ON A.inst_id = I.id;
```

15.
```
SELECT S.id,
       S.tot_cred - Coalesce(Sum(credits), 0)
FROM   (student S
        LEFT JOIN takes T
               ON S.id = T.stud_id
       )
       LEFT JOIN class C
              ON T.class_id = C.id
GROUP BY S.id;
```

16.
```
WITH recursive Pres AS (
    (SELECT prereq_id FROM Prereq WHERE class_id='BIO-399')
    UNION
    (SELECT P2.prereq_id FROM Pres P1, Prereq P2 WHERE P1.prereq_id = P2.class_id)
)
SELECT DISTINCT *
FROM Pres;
```