Lab: Advanced SQL Queries

1 Null values

1. Find the employees whose commission is specified (i.e. including 0.0 commissions).

```
mysql> Select * from EMP where comm is not null;
+------+--------+----------+------+------------+---------+---------+------+
| EID  | ENAME  | JOB      | MGR  | HIRED      | SAL     | COMM    | DID  |
+------+--------+----------+------+------------+---------+---------+------+
| 7499 | ALLEN  | SALESMAN | 7698 | 1981-02-20 | 1600.00 |  300.00 |   30 |
| 7521 | WARD   | SALESMAN | 7698 | 1981-02-22 | 1250.00 |  500.00 |   30 |
| 7654 | MARTIN | SALESMAN | 7698 | 1981-09-28 | 1250.00 | 1400.00 |   30 |
| 7844 | TURNER | SALESMAN | 7698 | 1981-09-08 | 1500.00 |    0.00 |   30 |
+------+--------+----------+------+------------+---------+---------+------+
4 rows in set (0.05 sec)
```

2. Find the number of employees whose commission is specified (2 methods).
   First method :

```
mysql> select COUNT(*) from emp where comm is not null;
+----------+
| COUNT(*) |
+----------+
|        4 |
+----------+
1 row in set (0.00 sec)
```

   second method :

```
mysql> select COUNT(ename) from emp where comm is not null;
+--------------+
| COUNT(ename) |
+--------------+
|            4 |
+--------------+
1 row in set (0.00 sec)
```

3. Find the number of employees whose commission is not specified (2 methods).
   First method :

```
mysql> select COUNT(*) from emp where comm is null;
+----------+
| COUNT(*) |
+----------+
|       11 |
+----------+
1 row in set (0.05 sec)
```

   Second method :

```
mysql> select COUNT(ename) from emp where comm is null;
+--------------+
| COUNT(ename) |
+--------------+
|           11 |
+--------------+
1 row in set (0.00 sec)
```

4. Find the lowest, average and highest commission over all the employees (nulls ignored).

```
mysql> select min(comm),avg(comm),max(comm) from emp;
+-----------+------------+-----------+
| min(comm) | avg(comm)  | max(comm) |
+-----------+------------+-----------+
|      0.00 | 550.000000 |   1400.00 |
+-----------+------------+-----------+
1 row in set (0.05 sec)
```

5. Find the average commission over all the employees (nulls counted as 0.0).

```
mysql> select avg(coalesce(comm,0)) from emp;
+-----------------------+
| avg(coalesce(comm,0)) |
+-----------------------+
|            146.666667 |
+-----------------------+
1 row in set (0.00 sec)
```

6. Find the name and commission, expressed in Euro (1 € = $ 1.2) of all the employees.

```
mysql> select ename,comm/1.2 from emp;
+--------+-------------+
| ename  | comm/1.2    |
+--------+-------------+
| SMITH  |        NULL |
| ALLEN  |  250.000000 |
| WARD   |  416.666667 |
| JONES  |        NULL |
| MARTIN | 1166.666667 |
| BLAKE  |        NULL |
| CLARK  |        NULL |
| SCOTT  |        NULL |
| KING   |        NULL |
| TURNER |    0.000000 |
| ADAMS  |        NULL |
| JAMES  |        NULL |
| FORD   |        NULL |
| MILLER |        NULL |
| SMITH  |        NULL |
+--------+-------------+
15 rows in set (0.00 sec)
```

7. Find the name and total salary (including commission) of all the employees.

```
mysql> select ename, sal + coalesce(comm,0) from emp;
+--------+------------------------+
| ename  | sal + coalesce(comm,0) |
+--------+------------------------+
| SMITH  |                 800.00 |
| ALLEN  |                1900.00 |
| WARD   |                1750.00 |
| JONES  |                2975.00 |
| MARTIN |                2650.00 |
| BLAKE  |                2850.00 |
| CLARK  |                2450.00 |
| SCOTT  |                3000.00 |
| KING   |                5000.00 |
| TURNER |                1500.00 |
| ADAMS  |                1100.00 |
| JAMES  |                 950.00 |
| FORD   |                3000.00 |
| MILLER |                1300.00 |
| SMITH  |                3000.00 |
+--------+------------------------+
15 rows in set (0.01 sec)
```

8. Find the name of the company's top managers (i.e who don't have a manager).
9. Find the employees whose commission is less than 25% (nulls excluded).

```
mysql> select ename from emp
    -> where comm is not null
    -> and
    -> comm*4 < sal;
+--------+
| ename  |
+--------+
| ALLEN  |
| TURNER |
+--------+
2 rows in set (0.00 sec)
```

10. Find the employees whose commission is less than 25% (nulls counted as 0.0)

```
mysql> select ename from emp
    -> where coalesce(comm,0.0) * 4 < sal;
+--------+
| ename  |
+--------+
| SMITH  |
| ALLEN  |
| JONES  |
| BLAKE  |
| CLARK  |
| SCOTT  |
| KING   |
| TURNER |
| ADAMS  |
| JAMES  |
| FORD   |
| MILLER |
| SMITH  |
+--------+
13 rows in set (0.00 sec)
```

2. SQL92 Join Queries

1. Display (a) the product of tables EMP and DEPT, (b) the theta-join of EMP and DEPT on DID, and (c) the natural join of EMP and DEPT. Compare the schema and the population of the resulting tables.
    a) select * from emp,dept;

```
mysql> select * from EMP,DEPT;
```

EID	ENAME	JOB	MGR	HIRED	SAL	COMM	DID	DID	DNAME	DLOC
7369	SMITH	CLERK	7902	1980-12-17	800.00	NULL	20	10	ACCOUNTING	NEW-YORK
7369	SMITH	CLERK	7902	1980-12-17	800.00	NULL	20	20	RESEARCH	DALLAS
7369	SMITH	CLERK	7902	1980-12-17	800.00	NULL	20	30	SALES	CHICAGO
7369	SMITH	CLERK	7902	1980-12-17	800.00	NULL	20	40	OPERATIONS	BOSTON
7499	ALLEN	SALESMAN	7698	1981-02-20	1600.00	300.00	30	10	ACCOUNTING	NEW-YORK
7499	ALLEN	SALESMAN	7698	1981-02-20	1600.00	300.00	30	20	RESEARCH	DALLAS
7499	ALLEN	SALESMAN	7698	1981-02-20	1600.00	300.00	30	30	SALES	CHICAGO
7499	ALLEN	SALESMAN	7698	1981-02-20	1600.00	300.00	30	40	OPERATIONS	BOSTON
7521	WARD	SALESMAN	7698	1981-02-22	1250.00	500.00	30	10	ACCOUNTING	NEW-YORK
7521	WARD	SALESMAN	7698	1981-02-22	1250.00	500.00	30	20	RESEARCH	DALLAS
7521	WARD	SALESMAN	7698	1981-02-22	1250.00	500.00	30	30	SALES	CHICAGO
7521	WARD	SALESMAN	7698	1981-02-22	1250.00	500.00	30	40	OPERATIONS	BOSTON
7566	JONES	MANAGER	7839	1981-04-02	2975.00	NULL	20	10	ACCOUNTING	NEW-YORK
7566	JONES	MANAGER	7839	1981-04-02	2975.00	NULL	20	20	RESEARCH	DALLAS
7566	JONES	MANAGER	7839	1981-04-02	2975.00	NULL	20	30	SALES	CHICAGO
7566	JONES	MANAGER	7839	1981-04-02	2975.00	NULL	20	40	OPERATIONS	BOSTON
7654	MARTIN	SALESMAN	7698	1981-09-28	1250.00	1400.00	30	10	ACCOUNTING	NEW-YORK
7654	MARTIN	SALESMAN	7698	1981-09-28	1250.00	1400.00	30	20	RESEARCH	DALLAS
7654	MARTIN	SALESMAN	7698	1981-09-28	1250.00	1400.00	30	30	SALES	CHICAGO
7654	MARTIN	SALESMAN	7698	1981-09-28	1250.00	1400.00	30	40	OPERATIONS	BOSTON
7698	BLAKE	MANAGER	7839	1981-05-01	2850.00	NULL	30	10	ACCOUNTING	NEW-YORK
7698	BLAKE	MANAGER	7839	1981-05-01	2850.00	NULL	30	20	RESEARCH	DALLAS
7698	BLAKE	MANAGER	7839	1981-05-01	2850.00	NULL	30	30	SALES	CHICAGO
7698	BLAKE	MANAGER	7839	1981-05-01	2850.00	NULL	30	40	OPERATIONS	BOSTON
7782	CLARK	MANAGER	7839	1981-06-09	2450.00	NULL	10	10	ACCOUNTING	NEW-YORK
7782	CLARK	MANAGER	7839	1981-06-09	2450.00	NULL	10	20	RESEARCH	DALLAS
7782	CLARK	MANAGER	7839	1981-06-09	2450.00	NULL	10	30	SALES	CHICAGO
7782	CLARK	MANAGER	7839	1981-06-09	2450.00	NULL	10	40	OPERATIONS	BOSTON
7788	SCOTT	ANALYST	7566	1981-11-09	3000.00	NULL	20	10	ACCOUNTING	NEW-YORK
7788	SCOTT	ANALYST	7566	1981-11-09	3000.00	NULL	20	20	RESEARCH	DALLAS
7788	SCOTT	ANALYST	7566	1981-11-09	3000.00	NULL	20	30	SALES	CHICAGO
7788	SCOTT	ANALYST	7566	1981-11-09	3000.00	NULL	20	40	OPERATIONS	BOSTON
7839	KING	PRESIDENT	NULL	1981-11-17	5000.00	NULL	NULL	10	ACCOUNTING	NEW-YORK
7839	KING	PRESIDENT	NULL	1981-11-17	5000.00	NULL	NULL	20	RESEARCH	DALLAS
7839	KING	PRESIDENT	NULL	1981-11-17	5000.00	NULL	NULL	30	SALES	CHICAGO
7839	KING	PRESIDENT	NULL	1981-11-17	5000.00	NULL	NULL	40	OPERATIONS	BOSTON
7844	TURNER	SALESMAN	7698	1981-09-08	1500.00	0.00	30	10	ACCOUNTING	NEW-YORK
7844	TURNER	SALESMAN	7698	1981-09-08	1500.00	0.00	30	20	RESEARCH	DALLAS
7844	TURNER	SALESMAN	7698	1981-09-08	1500.00	0.00	30	30	SALES	CHICAGO
7844	TURNER	SALESMAN	7698	1981-09-08	1500.00	0.00	30	40	OPERATIONS	BOSTON
7876	ADAMS	CLERK	7788	1981-09-23	1100.00	NULL	20	10	ACCOUNTING	NEW-YORK
7876	ADAMS	CLERK	7788	1981-09-23	1100.00	NULL	20	20	RESEARCH	DALLAS
7876	ADAMS	CLERK	7788	1981-09-23	1100.00	NULL	20	30	SALES	CHICAGO
7876	ADAMS	CLERK	7788	1981-09-23	1100.00	NULL	20	40	OPERATIONS	BOSTON
7900	JAMES	CLERK	7698	1981-12-03	950.00	NULL	30	10	ACCOUNTING	NEW-YORK
7900	JAMES	CLERK	7698	1981-12-03	950.00	NULL	30	20	RESEARCH	DALLAS
7900	JAMES	CLERK	7698	1981-12-03	950.00	NULL	30	30	SALES	CHICAGO
7900	JAMES	CLERK	7698	1981-12-03	950.00	NULL	30	40	OPERATIONS	BOSTON
7902	FORD	ANALYST	7566	1981-12-03	3000.00	NULL	20	10	ACCOUNTING	NEW-YORK
7902	FORD	ANALYST	7566	1981-12-03	3000.00	NULL	20	20	RESEARCH	DALLAS
7902	FORD	ANALYST	7566	1981-12-03	3000.00	NULL	20	30	SALES	CHICAGO
7902	FORD	ANALYST	7566	1981-12-03	3000.00	NULL	20	40	OPERATIONS	BOSTON

b)

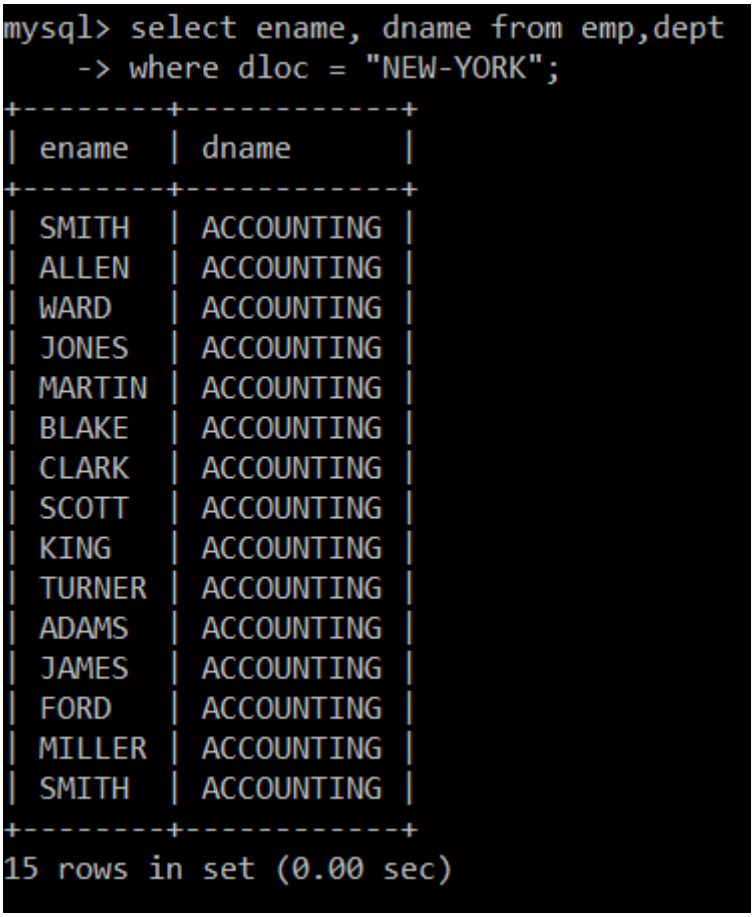
```
mysql> select did from emp, dept;
ERROR 1052 (23000): Column 'did' in field list is ambiguous
```

c) select * from emp INNER JOIN dept;

```
mysql> select * from emp INNER JOIN dept;
```

EID	ENAME	JOB	MGR	HIRED	SAL	COMM	DID	DID	DNAME	DLOC
7369	SMITH	CLERK	7902	1980-12-17	800.00	NULL	20	10	ACCOUNTING	NEW-YORK
7369	SMITH	CLERK	7902	1980-12-17	800.00	NULL	20	20	RESEARCH	DALLAS
7369	SMITH	CLERK	7902	1980-12-17	800.00	NULL	20	30	SALES	CHICAGO
7369	SMITH	CLERK	7902	1980-12-17	800.00	NULL	20	40	OPERATIONS	BOSTON
7499	ALLEN	SALESMAN	7698	1981-02-20	1600.00	300.00	30	10	ACCOUNTING	NEW-YORK
7499	ALLEN	SALESMAN	7698	1981-02-20	1600.00	300.00	30	20	RESEARCH	DALLAS
7499	ALLEN	SALESMAN	7698	1981-02-20	1600.00	300.00	30	30	SALES	CHICAGO
7499	ALLEN	SALESMAN	7698	1981-02-20	1600.00	300.00	30	40	OPERATIONS	BOSTON
7521	WARD	SALESMAN	7698	1981-02-22	1250.00	500.00	30	10	ACCOUNTING	NEW-YORK
7521	WARD	SALESMAN	7698	1981-02-22	1250.00	500.00	30	20	RESEARCH	DALLAS
7521	WARD	SALESMAN	7698	1981-02-22	1250.00	500.00	30	30	SALES	CHICAGO
7521	WARD	SALESMAN	7698	1981-02-22	1250.00	500.00	30	40	OPERATIONS	BOSTON
7566	JONES	MANAGER	7839	1981-04-02	2975.00	NULL	20	10	ACCOUNTING	NEW-YORK
7566	JONES	MANAGER	7839	1981-04-02	2975.00	NULL	20	20	RESEARCH	DALLAS
7566	JONES	MANAGER	7839	1981-04-02	2975.00	NULL	20	30	SALES	CHICAGO
7566	JONES	MANAGER	7839	1981-04-02	2975.00	NULL	20	40	OPERATIONS	BOSTON
7654	MARTIN	SALESMAN	7698	1981-09-28	1250.00	1400.00	30	10	ACCOUNTING	NEW-YORK
7654	MARTIN	SALESMAN	7698	1981-09-28	1250.00	1400.00	30	20	RESEARCH	DALLAS
7654	MARTIN	SALESMAN	7698	1981-09-28	1250.00	1400.00	30	30	SALES	CHICAGO
7654	MARTIN	SALESMAN	7698	1981-09-28	1250.00	1400.00	30	40	OPERATIONS	BOSTON
7698	BLAKE	MANAGER	7839	1981-05-01	2850.00	NULL	30	10	ACCOUNTING	NEW-YORK
7698	BLAKE	MANAGER	7839	1981-05-01	2850.00	NULL	30	20	RESEARCH	DALLAS
7698	BLAKE	MANAGER	7839	1981-05-01	2850.00	NULL	30	30	SALES	CHICAGO
7698	BLAKE	MANAGER	7839	1981-05-01	2850.00	NULL	30	40	OPERATIONS	BOSTON
7782	CLARK	MANAGER	7839	1981-06-09	2450.00	NULL	10	10	ACCOUNTING	NEW-YORK
7782	CLARK	MANAGER	7839	1981-06-09	2450.00	NULL	10	20	RESEARCH	DALLAS
7782	CLARK	MANAGER	7839	1981-06-09	2450.00	NULL	10	30	SALES	CHICAGO
7782	CLARK	MANAGER	7839	1981-06-09	2450.00	NULL	10	40	OPERATIONS	BOSTON
7788	SCOTT	ANALYST	7566	1981-11-09	3000.00	NULL	20	10	ACCOUNTING	NEW-YORK
7788	SCOTT	ANALYST	7566	1981-11-09	3000.00	NULL	20	20	RESEARCH	DALLAS
7788	SCOTT	ANALYST	7566	1981-11-09	3000.00	NULL	20	30	SALES	CHICAGO
7788	SCOTT	ANALYST	7566	1981-11-09	3000.00	NULL	20	40	OPERATIONS	BOSTON
7839	KING	PRESIDENT	NULL	1981-11-17	5000.00	NULL	NULL	10	ACCOUNTING	NEW-YORK
7839	KING	PRESIDENT	NULL	1981-11-17	5000.00	NULL	NULL	20	RESEARCH	DALLAS
7839	KING	PRESIDENT	NULL	1981-11-17	5000.00	NULL	NULL	30	SALES	CHICAGO
7839	KING	PRESIDENT	NULL	1981-11-17	5000.00	NULL	NULL	40	OPERATIONS	BOSTON
7844	TURNER	SALESMAN	7698	1981-09-08	1500.00	0.00	30	10	ACCOUNTING	NEW-YORK
7844	TURNER	SALESMAN	7698	1981-09-08	1500.00	0.00	30	20	RESEARCH	DALLAS
7844	TURNER	SALESMAN	7698	1981-09-08	1500.00	0.00	30	30	SALES	CHICAGO
7844	TURNER	SALESMAN	7698	1981-09-08	1500.00	0.00	30	40	OPERATIONS	BOSTON
7876	ADAMS	CLERK	7788	1981-09-23	1100.00	NULL	20	10	ACCOUNTING	NEW-YORK
7876	ADAMS	CLERK	7788	1981-09-23	1100.00	NULL	20	20	RESEARCH	DALLAS
7876	ADAMS	CLERK	7788	1981-09-23	1100.00	NULL	20	30	SALES	CHICAGO
7876	ADAMS	CLERK	7788	1981-09-23	1100.00	NULL	20	40	OPERATIONS	BOSTON
7900	JAMES	CLERK	7698	1981-12-03	950.00	NULL	30	10	ACCOUNTING	NEW-YORK
7900	JAMES	CLERK	7698	1981-12-03	950.00	NULL	30	20	RESEARCH	DALLAS
7900	JAMES	CLERK	7698	1981-12-03	950.00	NULL	30	30	SALES	CHICAGO
7900	JAMES	CLERK	7698	1981-12-03	950.00	NULL	30	40	OPERATIONS	BOSTON
7902	FORD	ANALYST	7566	1981-12-03	3000.00	NULL	20	10	ACCOUNTING	NEW-YORK
7902	FORD	ANALYST	7566	1981-12-03	3000.00	NULL	20	20	RESEARCH	DALLAS
7902	FORD	ANALYST	7566	1981-12-03	3000.00	NULL	20	30	SALES	CHICAGO
7902	FORD	ANALYST	7566	1981-12-03	3000.00	NULL	20	40	OPERATIONS	BOSTON
7934	MILLER	CLERK	7782	1982-01-23	1300.00	NULL	10	10	ACCOUNTING	NEW-YORK
7934	MILLER	CLERK	7782	1982-01-23	1300.00	NULL	10	20	RESEARCH	DALLAS
7934	MILLER	CLERK	7782	1982-01-23	1300.00	NULL	10	30	SALES	CHICAGO

2. Find the name and the department of the employee who works in New-York.



```
mysql> select ename, dname from emp,dept
    -> where dloc = "NEW-YORK";
+--------+------------+
| ename  | dname      |
+--------+------------+
| SMITH  | ACCOUNTING |
| ALLEN  | ACCOUNTING |
| WARD   | ACCOUNTING |
| JONES  | ACCOUNTING |
| MARTIN | ACCOUNTING |
| BLAKE  | ACCOUNTING |
| CLARK  | ACCOUNTING |
| SCOTT  | ACCOUNTING |
| KING   | ACCOUNTING |
| TURNER | ACCOUNTING |
| ADAMS  | ACCOUNTING |
| JAMES  | ACCOUNTING |
| FORD   | ACCOUNTING |
| MILLER | ACCOUNTING |
| SMITH  | ACCOUNTING |
+--------+------------+
15 rows in set (0.00 sec)
```

3. Find the name of the employee who did a mission in the city they work in.

```
mysql> SELECT DISTINCT emp.eid,ename FROM emp
    -> INNER JOIN dept
    -> INNER JOIN mission
    -> ON
    -> emp.did = dept.did
    -> AND
    -> dept.dloc = mission.mloc;
+------+--------+
| eid  | ename  |
+------+--------+
| 7499 | ALLEN  |
| 7521 | WARD   |
| 7654 | MARTIN |
| 7698 | BLAKE  |
| 7844 | TURNER |
| 7900 | JAMES  |
| 7369 | SMITH  |
| 7566 | JONES  |
| 7788 | SCOTT  |
| 7876 | ADAMS  |
| 7902 | FORD   |
+------+--------+
11 rows in set (0.05 sec)
```

4. Find the name of the name of the employees along with the name of their manager

```
mysql> select T1.ename, T2.ename
    -> from emp T1, emp T2
    -> where T1.mgr = t2.eid;
+--------+-------+
| ename  | ename |
+--------+-------+
| SMITH  | FORD  |
| ALLEN  | BLAKE |
| WARD   | BLAKE |
| JONES  | KING  |
| MARTIN | BLAKE |
| BLAKE  | KING  |
| CLARK  | KING  |
| SCOTT  | JONES |
| TURNER | BLAKE |
| ADAMS  | SCOTT |
| JAMES  | BLAKE |
| FORD   | JONES |
| MILLER | CLARK |
| SMITH  | KING  |
+--------+-------+
14 rows in set (0.00 sec)
```

5. Find the name of the employees who have the same manager as Allen.

```
mysql> select T1.ename from emp T1,emp T2
    -> where T2.ename = 'ALLEN'
    -> AND
    -> T2.mgr = T1.mgr
    -> AND
    -> T1.ename != 'ALLEN';
+--------+
| ename  |
+--------+
| WARD   |
| MARTIN |
| TURNER |
| JAMES  |
+--------+
4 rows in set (0.00 sec)
```

6. Find the name and hire date of the employees who were hired before their manager; also display the manager's hire date.

```
mysql> select T1.ename, T1.hired, T2.ename, T2.hired from emp T1, emp T2
    -> where
    -> T1.hired < T2.hired
    -> AND
    -> T1.mgr = T2.eid;
+-------+------------+-------+------------+
| ename | hired      | ename | hired      |
+-------+------------+-------+------------+
| SMITH | 1980-12-17 | FORD  | 1981-12-03 |
| ALLEN | 1981-02-20 | BLAKE | 1981-05-01 |
| WARD  | 1981-02-22 | BLAKE | 1981-05-01 |
| JONES | 1981-04-02 | KING  | 1981-11-17 |
| BLAKE | 1981-05-01 | KING  | 1981-11-17 |
| CLARK | 1981-06-09 | KING  | 1981-11-17 |
| ADAMS | 1981-09-23 | SCOTT | 1981-11-09 |
| SMITH | 1980-12-17 | KING  | 1981-11-17 |
+-------+------------+-------+------------+
8 rows in set (0.00 sec)
```

7. Find the name of the employee in the sale department who were hired the same days as an employee in the research department

```
mysql> select T1.ename from emp T1, emp T2
    -> INNER JOIN dept D1, dept D2
    -> WHERE
    -> D1.did = T1.did
    -> AND
    -> D1.dname = 'SALES'
    -> AND
    -> D2.did = T2.did
    -> AND
    -> D2.dname = 'RESEARCH'
    -> AND
    -> T1.hired = T2.hired;
+-------+
| ename |
+-------+
| JAMES |
+-------+
1 row in set (0.01 sec)
```

8. Find the departments that do not have any employee

```
mysql> select D1.dname from dept D1
    -> left join emp
    -> on emp.did = D1.did
    -> WHERE emp.did IS NULL;
+------------+
| dname      |
+------------+
| OPERATIONS |
+------------+
1 row in set (0.00 sec)
```

9. Find the name of the employees with the highest salary

```
mysql> SELECT ename,max(sal) from emp;
+-------+----------+
| ename | max(sal) |
+-------+----------+
| SMITH |  5000.00 |
+-------+----------+
1 row in set (0.00 sec)
```

10. Find the name of the employees who were hired before all the employees of the Accounting department

3. Subqueries

1. Find the employees with the highest salary (2 methods).
   a)
   b)

```
mysql> select eid,ename,max(sal) from emp;
+------+-------+----------+
| eid  | ename | max(sal) |
+------+-------+----------+
| 7369 | SMITH |  5000.00 |
+------+-------+----------+
1 row in set (0.05 sec)
```