Question #1 of 10

Find all managers where the number of departments that she/he is managing is equal to the number of projects that she/he is supervising.

Answer the question by creating a SQL view with the schema shown below, where eid is a manager's identifier.

```
CREATE VIEW v1 (eid) AS ;
```

Question #2 of 10

Two distinct engineers are considered to be **collaborators** if they are working together on some project. For each engineer, find the number of her/his distinct collaborators.

Answer the question by creating a SQL view with the schema shown below, where eid is the identifier of an engineer and num is the number of her/his distinct collaborators from all the projects that the engineer is working on. The value of num should be 0 if the engineer has no collaborators.

```
CREATE VIEW v2 (eid, num) AS ;
```

Question #3 of 10

For each office O, find the following information:

- the number of departments located in O,
- the number of employees located in O,
- the number of managers located in O, and
- the number of engineers located in O.

If any of the last four output attributes is not applicable (e.g., there is no engineer located at an office), its value should be 0.

Answer the question by creating a SQL view with the schema shown below, where oid is the identifier of an office, numDept is the number of departments located in that office, numEmp is the number of employees located in that office, numMgr is the number of managers located in that office, and numEngr is the number of engineers located in that office.

```
CREATE VIEW v3 (oid, numDept, numEmp, numMgr, numEngr) AS ;
```

Question #4 of 10

Find all managers who are managing themselves; i.e., a manager M who belongs to a department that is managed by M herself/himself.

Answer the question by creating a SQL view with the schema shown below, where eid is the identifier of a manager.

```
CREATE VIEW v4 (eid) AS ;
```

Question #5 of 10

Find all projects where every engineer who works on that project specializes in at least the area named 'A'.

Answer the question by creating a SQL view with the schema shown below, where pid is the identifier of a project.

```
CREATE VIEW v5 (pid) AS ;
```

Question #6 of 10

Find pairs of engineers (E1,E2) where E1's set of of specialized areas is a proper superset of that of E2, and E2 must specialize in at least one area.

Note: Given two sets X and Y, X is a proper superset of Y if (Y - X) is empty and (X - Y) is non-empty.

Answer the question by creating a SQL view with the schema shown below, where eid and eid2 are the identifiers of the engineers E1 and E2, respectively.

```
CREATE VIEW v6 (eid, eid2) AS ;
```

Question #7 of 10

Find all engineer-manager pairs (E,M) where both E and M belong to the same department, E works on at least one project, and the set of projects that E works on is exactly the set of projects that is supervised by M.

Answer the question by creating a SQL view with the schema shown below, where eid and mid are the identifiers of E and M, respectively.

```
CREATE VIEW v7 (eid, mid) AS ;
```

Question #8 of 10

Given two engineers E1 and E2, we say that E1 works longer hours than E2 if for every project P that is worked on by both E1 and E2, E1's weekly hours for P is higher than that for E2. Find all pairs of engineers (E1,E2) where E1 works longer hours than E2 and there must exist at least one project that both E1 and E2 work on.

Answer the question by creating a SQL view with the schema shown below, where eid and eid2 are the identifiers of the engineers E1 and E2, respectively.

```
CREATE VIEW v8 (eid, eid2) AS ;
```

Question #9 of 10

A new project is looking for a team of two engineers to work on that project. To join this new project, the two engineers must satisfy the following conditions:

- the two engineers must belong to the same department,
- each engineer's total weekly project hours (over all of the projects that the engineer is working on) must be at most 20, and
- the sum of the two engineers' total weekly project hours must be at most 30.

Find all pairs of engineers that satisfy the above requirements.

Answer the question by creating a SQL view with the schema shown below, where eid and eid2 are the identifiers of the two engineers who can join the new project such that eid < eid2.

```
CREATE VIEW v9 (eid, eid2) AS ;
```

Question #10 of 10

For each manager M, let **deptBudget(M)** denote the sum of the department budget dbudget from all the departments that are managed by M, and **projectBudget(M)** denote the sum of the project budget pbudget from all the projects that are supervised by M. If M does not manage any department, then deptBudget(M) = 0. If M does not supervise any project, then projectBudget(M) = 0.

Given two managers, M1 and M2, we say that M1 has **more resources** than M2 if either

- deptBudget(M1) > deptBudget(M2) and projectBudget(M1) >= projectBudget(M2), or
- deptBudget(M1) >= deptBudget(M2) and projectBudget(M1) > projectBudget(M2).

Find all managers M such that there does not exist any manager that has more resources than M. Exclude managers M where deptBudget(M) = 0 and projectBudget(M) = 0.

Answer the question by creating a SQL view with the schema shown below, where eid is the identifier of a manager.

```
CREATE VIEW v10 (eid) AS ;
```