```
Question 1
> SELECT A.Fname, A.Lname, B.Fname, B.Lname
    -> FROM Student AS A, Student AS B
    -> WHERE (A.stuID IN (SELECT WhoIsLiked FROM Likes WHERE B.stuID = Likes.WhoLikes))
    -> AND (B.stuID IN (SELECT WhoIsLiked FROM Likes WHERE A.stuID = Likes.WhoLikes))
    -> AND ((B.stuID not IN (SELECT WhoIsLoved FROM Loves WHERE A.stuID = Loves.WhoLoves))
    -> OR (A.stuID not IN (SELECT WhoIsLoved FROM Loves WHERE B.stuID = Loves.WhoLoves)))
    -> AND A.City_Code = B.City_Code
    -> AND A.stuID<B.stuID;
+---------+----------+-------+---------+
| Fname   | Lname    | Fname | Lname   |
+---------+----------+-------+---------+
| Ian     | Thornton | David | Shieber |
| Andy    | Schultz  | Stacy | Prater  |
| Jandy   | Nelson   | Stacy | Prater  |
| Michael | Woods    | Sarah | Smith   |
+---------+----------+-------+---------+
4 rows in set (0.064 sec)

Question 2
> SELECT Student.Fname, Student.Lname, Car.CarManufacturer, Car.CarModel,
Car.miles_per_gallon
    -> FROM Student, Car, Car_Ownership,
    -> (SELECT MIN(Car.miles_per_gallon) AS miles_per_gallon
    -> FROM Car) as MIN
    -> WHERE Student.StuID = Car_Ownership.StuID
    -> AND Car.CarID = Car_Ownership.CarID
    -> AND Car.miles_per_gallon = MIN.miles_per_gallon;
+-------+-------+-----------------+----------+------------------+
| Fname | Lname | CarManufacturer | CarModel | miles_per_gallon |
+-------+-------+-----------------+----------+------------------+
| Lisa  | Apap  | Porsche         | 911      |                7 |
+-------+-------+-----------------+----------+------------------+
1 row in set (0.003 sec)

Question 3
> SELECT DISTINCT S.Fname, S.Lname, S.Age, D.DName
    -> FROM Student AS S, Department AS D, Car_Ownership as C
    -> WHERE S.Stuid = C.Stuid and  not exists(
    -> (SELECT CarModel
    ->  FROM Car
    ->  WHERE CarManufacturer = "Nissan")
    ->  EXCEPT
    ->  (SELECT R.CarModel
    ->  FROM  Car AS R, Car_Ownership AS C
    ->  WHERE S.StuID = C.StuID
    ->  AND R.CarID = C.CarID))
    -> AND S.Major = D.DNO;
+-------+--------+------+------------------+
| Fname | Lname  | Age  | DName            |
+-------+--------+------+------------------+
| Bruce | Wilson |   27 | Computer Science |
+-------+--------+------+------------------+
1 row in set (0.015 sec)


Question 4
> SELECT Student.Fname, Student.Lname
    -> FROM Student, Car_Ownership
    -> WHERE Student.StuID = Car_Ownership.StuID
    -> GROUP BY Car_Ownership.StuID
    -> HAVING COUNT(Car_Ownership.CarID) >1;
+--------+--------+
| Fname  | Lname  |
+--------+--------+
| Steven | Davis  |
| Bruce  | Wilson |
+--------+--------+
2 rows in set (0.009 sec)

Question 5
> SELECT DISTINCT Student.Fname, Student.Lname
    -> FROM Student,Lives_in, Has_Pet, Car_Ownership
    -> WHERE Student.StuID IN (SELECT StuID FROM  Lives_in)
    -> AND Student.StuID  IN (SELECT StuID FROM Has_Pet)
    -> AND Student.StuID NOT IN (SELECT StuID FROM Car_Ownership);
+-------+-------+
| Fname | Lname |
+-------+-------+
| Paul  | Brody |
| Lisa  | Cheng |
+-------+-------+
2 rows in set (0.048 sec)

Question 7
> SELECT MIN(Car.miles_per_gallon) AS min_MPG,MAX(Car.miles_per_gallon) AS
max_MPG,AVG(Car.miles_per_gallon)AS avg_MPG
    -> FROM Car
    -> WHERE CarManufacturer = "Porsche";
+---------+---------+---------+
| min_MPG | max_MPG | avg_MPG |
+---------+---------+---------+
|       7 |      19 | 12.6667 |
+---------+---------+---------+
1 row in set (0.004 sec)

Question 8
> SELECT MIN(Student.Age), MAX(Student.Age), AVG(Student.Age)
    -> FROM Student, Lives_in, Car_Ownership
    -> WHERE Student.stuID IN(SELECT StuID FROM Lives_in)
    -> AND Student.stuID not IN (SELECT StuID FROM Car_Ownership);
+------------------+------------------+------------------+
| MIN(Student.Age) | MAX(Student.Age) | AVG(Student.Age) |
+------------------+------------------+------------------+
|               16 |               26 |          19.2857 |
+------------------+------------------+------------------+
1 row in set (0.036 sec)

Question 10
> SELECT AVG(T.Age)
    -> FROM
    -> (SELECT Student.Age
    -> FROM Student, Participates_in
    -> WHERE Student.StuID = Participates_in.StuID
    -> GROUP BY Student.StuID
    -> HAVING COUNT(DISTINCT Participates_in.ActID)>2) as T;
+------------+
| AVG(T.Age) |
+------------+
|    20.1818 |
+------------+
1 row in set (0.011 sec)


Question 11
> SELECT T2.Act_name, T2.act_cnt
    -> FROM
    -> (SELECT MAX(T.act_cnt) AS max_cnt
    -> FROM (
    -> SELECT Activity.activity_name AS Act_name, COUNT(Participates_in.stuid) AS act_cnt
    -> FROM Activity, Participates_in
    -> WHERE Activity.actid = Participates_in.actid
    -> GROUP BY Participates_in.actid) AS T) AS T1,
    ->
    -> (SELECT Activity.activity_name AS Act_name, COUNT(Participates_in.stuid) AS act_cnt
    -> FROM Activity, Participates_in
    -> WHERE Activity.actid = Participates_in.actid
    -> GROUP BY Participates_in.actid) AS T2
    -> WHERE T2.act_cnt = T1.max_cnt;
+----------+---------+
| Act_name | act_cnt |
+----------+---------+
| Football |      14 |
+----------+---------+
1 row in set (0.043 sec)

Question 12
> SELECT DISTINCT Activity.activity_name
    -> FROM Activity, Participates_in, Faculty_Participates_in
    -> WHERE Activity.actid not IN (SELECT actid FROM Participates_in)
    -> AND Activity.actid IN (SELECT actid FROM Faculty_Participates_in);
+----------------+
| activity_name  |
+----------------+
| Square Dancing |
+----------------+
1 row in set (0.008 sec)

Question 13
> SELECT DISTINCT A.Fname, A.Lname
    -> FROM Student AS A, Student AS B, Student AS C,Student AS D, Enrolled_in AS EIA,
Enrolled_in AS EIB, Enrolled_in AS EIC,Lives_in AS LIC, Lives_in AS LID, City,
VotedForElectioninUS,USCandidate
    -> WHERE A.StuID = EIA.StuID AND A.StuID != B.StuID AND B.StuID = EIB.StuID AND C.StuID =
EIC.StuID AND EIA.CID = EIB.CID AND EIA.StuID != EIB.StuID AND EIB.CID = EIC.CID AND
EIB.Stuid != EIC.Stuid
    -> AND C.StuID = LIC.stuid AND D.StuID = LID.stuid AND LIC.dormid = LID.dormid AND
LIC.room_number=LID.room_number
    -> AND D.city_code = City.city_code AND City.state = "PA"
    -> AND D.StuID = VotedForElectioninUS.StuID AND VotedForElectioninUS.Year = "2020" AND
VotedForElectioninUS.CandidateID = USCandidate.CandidateId AND USCandidate.CandidateName =
"Donald Trump" ;
Empty set (0.194 sec)


Question 14
> SELECT DISTINCT Student.Fname, Student.Lname, Faculty.Fname, Faculty.Lname
    -> FROM Student, Faculty, Participates_in, Faculty_Participates_in, Course
    -> WHERE Student.Advisor = Faculty.FacID
    -> AND Student.StuID = Participates_in.StuID AND Participates_in.ActID =
Faculty_Participates_in.ActID AND Faculty.FacID = Faculty_Participates_in.FacID
    -> AND Faculty.FacID IN (SELECT Instructor FROM Course);
+---------+----------+---------+----------+
| Fname   | Lname    | Fname   | Lname    |
+---------+----------+---------+----------+
| Linda   | Smith    | Michael | Goodrich |
| Paul    | Gompers  | Michael | Goodrich |
| Eric    | Tai      | David   | Yarowsky |
| Michael | Leighton | Michael | Goodrich |
| Arthur  | Pang     | David   | Yarowsky |
+---------+----------+---------+----------+
5 rows in set (0.008 sec)

Question 15
```

```
> SELECT DISTINCT A.Fname, A.Lname, B.Fname, B.Lname
    -> FROM Student AS A, Student AS B, Lives_in AS LIA, Lives_in AS LIB, City AS CityA, City
AS CityB
    -> WHERE A.StuID = LIA.StuID AND B.StuID = LIB.StuID AND LIA.DormID = LIB.DormID AND
LIA.Room_number = LIB.Room_number
    -> AND A.City_Code = CityA.City_code AND B.City_Code = CityB.City_code
    -> AND CityA.Country != CityB.Country
    -> AND A.StuID < B.StuID;
+-------+---------+--------+-------+
| Fname | Lname   | Fname  | Lname |
+-------+---------+--------+-------+
| Paul  | Gompers | Steven | Davis |
| Tracy | Kim     | Sarah  | Smith |
| Derek | Lee     | Susan  | Lee   |
+-------+---------+--------+-------+
3 rows in set (0.022 sec)

Question 16
> SELECT TT.avg_GPA, TT.DormID,TT.dorm_name
    -> FROM
    -> (SELECT AVG(T.GPA) AS avg_GPA, T.DormID, Dorm.dorm_name
    -> FROM Dorm,
    -> (SELECT S.StuID, (totals / totalcredits) AS GPA, Lives_in.DormID
    -> FROM Student AS S,
    -> (
    -> SELECT t.StuID, SUM(t.credits) AS totalcredits, SUM(t.credits * t.gradepoINt) AS
totals
    -> FROM ( SELECT S.StuID, C.credits, G.gradepoint
    -> FROM Student AS S, Enrolled_in AS E, Course AS C, Gradeconversion AS G
    -> WHERE S.StuID = E.stuid AND E.cid = C.cid AND E.grade = G.lettergrade) AS t
    -> GROUP BY t.StuID) AS tt
    -> ,Lives_in
    -> WHERE S.StuID = tt.StuID AND S.StuID = Lives_in.StuID
    -> )AS T
    -> WHERE Dorm.dormid = T.DormID
    -> GROUP BY T.DormID)AS TT
    -> ,
    ->
    -> (SELECT MAX(TT.avg_GPA) AS max_GPA
    -> FROM
    -> (SELECT AVG(T.GPA) AS avg_GPA, T.DormID
    -> FROM
    -> (SELECT S.StuID, (totals / totalcredits) AS GPA, Lives_in.DormID
    -> FROM Student AS S,
    -> (
    -> SELECT t.StuID, SUM(t.credits) AS totalcredits, SUM(t.credits * t.gradepoint) AS
totals
    -> FROM ( SELECT S.StuID, C.credits, G.gradepoint
    -> FROM Student AS S, Enrolled_in AS E, Course AS C, Gradeconversion AS G
    -> WHERE S.StuID = E.stuid AND E.cid = C.cid AND E.grade = G.lettergrade) AS t
    -> GROUP BY t.StuID) AS tt
    -> ,Lives_in
    -> WHERE S.StuID = tt.StuID AND S.StuID = Lives_in.StuID
    -> )AS T
    -> GROUP BY T.DormID) AS TT) AS MAX
    -> WHERE TT.avg_GPA = MAX.max_GPA
    -> ;
+-------------------+--------+----------------+
| avg_GPA           | DormID | dorm_name      |
+-------------------+--------+----------------+
| 3.824999988079071 |    110 | Bud Jones Hall |
+-------------------+--------+----------------+
1 row in set (4.344 sec)

#Question 17 part 1
```

```
> CREATE TABLE BALTIMORE_DISTANCE(
    ->   city1_code varchar(3) ,
    ->   city2_code varchar(3) ,
    ->   distance INTEGER
    -> ) ;
Query OK, 0 rows affected (0.010 sec)
 > INSERT INTO BALTIMORE_DISTANCE(city1_code,city2_code,distance)
    -> SELECT T.city1_code, T.city2_code,t3.distance+t4.distance AS distance
    -> FROM Direct_distance AS t3, Direct_distance AS t4,
    -> (SELECT DISTINCT t1.city2_code AS city1_code, t2.city2_code
    -> FROM Direct_distance AS t1, Direct_distance AS t2
    -> WHERE t1.city2_code != t2.city2_code
    -> ) AS T
    -> WHERE t3.city1_code = T.city1_code AND t3.city2_code = "BAL"
    -> AND t4.city1_code = T.city2_code AND t4.city2_code = "BAL"
    -> UNION
    -> SELECT DISTINCT t1.city2_code AS city1_code, t2.city2_code, 0 as distance
    -> FROM Direct_distance AS t1, Direct_distance AS t2
    -> WHERE t1.city2_code = t2.city2_code;
Query OK, 961 rows affected (0.097 sec)
Records: 961  Duplicates: 0  Warnings: 0

#Question 17 part 2
> DROP TABLE if exists RECTANGULAR_DISTANCE;
Query OK, 0 rows affected (0.175 sec)

MariaDB [20fa_rzhang58_db]> CREATE TABLE RECTANGULAR_DISTANCE(
    ->   city1_code varchar(3) ,
    ->   city2_code varchar(3) ,
    ->   distance INTEGER
    -> ) ;
Query OK, 0 rows affected (0.234 sec)


> INSERT INTO RECTANGULAR_DISTANCE(city1_code,city2_code,distance)
    -> SELECT DISTINCT BALTIMORE_DISTANCE.city1_code, BALTIMORE_DISTANCE.city2_code,
sqrt(power((70 * CityA.latitude - 70 * CityB.latitude),2)+power((70 * CityA.longitude - 70 *
CityB.longitude),2)) AS distance
    -> FROM BALTIMORE_DISTANCE, City AS CityA, City AS CityB
    -> WHERE BALTIMORE_DISTANCE.city1_code = CityA.city_code AND
BALTIMORE_DISTANCE.city2_code = CityB.city_code;
Query OK, 961 rows affected (1.767 sec)
Records: 961  Duplicates: 0  Warnings: 0


#Question 17 part 3
> CREATE TABLE ALL_DISTANCES (
    ->   city1_code varchar(3) ,
    ->   city2_code varchar(3) ,
    ->   direct_distance INTEGER,
    ->   baltimore_distance INTEGER,
    ->   rectangular_distance INTEGER
    -> ) ;
Query OK, 0 rows affected (0.286 sec)
> INSERT INTO
ALL_DISTANCES(city1_code,city2_code,direct_distance,baltimore_distance,rectangular_distance)
    -> SELECT DISTINCT temp.city1_code, temp.city2_code,  MAX(Direct_distance) as
direct_distance, MAX(Bal_distance) as baltimore_distance,MAX(Rec_distance) as
rectangular_distance
    -> FROM (
    -> SELECT Rec.city1_code, Rec.city2_code, Rec.distance AS Rec_distance, NULL AS
Direct_distance, NULL AS Bal_distance
    -> FROM RECTANGULAR_DISTANCE AS Rec
    -> UNION
    -> SELECT DirectD.city1_code, DirectD.city2_code, NULL AS Rec_distance, DirectD.distance
```

```
AS Direct_distance, NULL AS Bal_distance
    -> FROM Direct_distance AS DirectD
    -> WHERE DirectD.city1_code != DirectD.city2_code
    -> UNION
    -> SELECT Bal_dis.city1_code, Bal_dis.city2_code, NULL AS Rec_distance, NULL AS
Direct_distance, Bal_dis.distance AS Bal_distance
    -> FROM BALTIMORE_DISTANCE AS Bal_dis
    -> ) AS temp
    -> GROUP BY temp.city1_code, temp.city2_code;
Query OK, 961 rows affected (0.100 sec)
Records: 961  Duplicates: 0  Warnings: 0

#Question 17 part 4
> CREATE TABLE BEST_DISTANCE (
    ->   city1_code varchar(3) ,
    ->   city2_code varchar(3) ,
    ->   distance INTEGER
    -> ) ;
Query OK, 0 rows affected (0.214 sec)

> INSERT INTO BEST_DISTANCE(city1_code,city2_code,distance)
    -> SELECT DISTINCT T.city1_code,T.city2_code,T.distance
    -> FROM
    -> (SELECT DISTINCT B.city1_code, B.city2_code, D.distance
    -> FROM ALL_DISTANCES AS B,Direct_distance AS D
    -> WHERE B.city1_code = D.city1_code AND B.city2_code = D.city2_code
    -> Union ALL
    -> SELECT DISTINCT A.city1_code, A.city2_code,
least(A.baltimore_distance,A.rectangular_distance)
    -> FROM ALL_DISTANCES AS A
    -> WHERE NOT EXISTS (
    ->     SELECT D.city1_code, D.city2_code FROM Direct_distance AS D
    ->     WHERE A.city1_code= D.city1_code AND A.city2_code = D.city2_code)) AS T;
Query OK, 961 rows affected (0.316 sec)
Records: 961  Duplicates: 0  Warnings: 0

#Question 18
> SELECT DISTINCT City.city_name, T.cnt
    -> FROM City,
    -> (SELECT Student.city_code, COUNT(Student.StuID) AS cnt
    -> FROM Student
    -> GROUP BY Student.city_code
    -> HAVING COUNT(Student.StuID)>=2) AS T
    -> WHERE City.city_code = T.city_code;
+--------------+-----+
| city_name    | cnt |
+--------------+-----+
| Baltimore    |   4 |
| Pittsburgh   |   4 |
| Philadelphia |   3 |
| Washington   |   3 |
| New York     |   3 |
| Toronto      |   2 |
| Hong Kong    |   3 |
+--------------+-----+
7 rows in set (0.001 sec)

#Question 19
> SELECT DISTINCT A.Fname, A.Lname, D.city_name, D.state, D.country
    -> FROM Student AS A, Student AS B, BEST_DISTANCE AS C, City AS D, City as E,
    -> (SELECT LA.stuid AS stuid1, LB.stuid  AS stuid2
    -> FROM Lives_in AS LA, Lives_in AS LB,
    -> (SELECT Lives_in.DormID
    -> FROM Lives_in
    -> GROUP BY Lives_in.DormID
    -> HAVING count(DISTINCT Lives_in.StuID)<300
    -> ) AS T
    -> WHERE LA.dormid = LB.dormid
    -> AND LA.dormid IN (T.DormID) AND LA.stuid != LB.stuid) AS TT
    -> WHERE A.StuID = TT.stuid1 AND B.StuID = TT.stuid2
    -> AND A.city_code = C.city1_code AND B.city_code = C.city2_code
    -> AND C.distance <= 100
    -> AND A.city_code = D.city_code
    -> AND B.city_code = E.city_code
    -> AND A.StuID != B.stuID;
+---------+----------+--------------+-------+---------+
| Fname   | Lname    | city_name    | state | country |
+---------+----------+--------------+-------+---------+
| Stacy   | Prater   | Baltimore    | MD    | USA     |
| Shiela  | Jones    | Washington   | DC    | USA     |
| Sarah   | Schmidt  | Washington   | DC    | USA     |
| George  | Andreou  | New York     | NY    | USA     |
| David   | Shieber  | New York     | NY    | USA     |
| Ian     | Thornton | New York     | NY    | USA     |
| Sarah   | Smith    | Philadelphia | PA    | USA     |
| Michael | Woods    | Philadelphia | PA    | USA     |
| Michael | Leighton | Pittsburgh   | PA    | USA     |
| Mark    | Goldman  | Pittsburgh   | PA    | USA     |
| Lisa    | Apap     | Pittsburgh   | PA    | USA     |
| Steven  | Davis    | Pittsburgh   | PA    | USA     |
+---------+----------+--------------+-------+---------+
12 rows in set (0.034 sec)



#Question 20
> SELECT DISTINCT Student.Fname, Student.Lname, City.Country
    -> FROM  Student,City,
    -> (SELECT DISTINCT City.city_name, City.City_Code
    -> FROM City, BEST_DISTANCE,
    -> (SELECT MAX(T.distance) AS max_dis, T.country
    -> FROM
    -> (SELECT DISTINCT Student.city_code, City.country, City.city_name,
BEST_DISTANCE.distance
    -> FROM City, BEST_DISTANCE, Student
    -> WHERE Student.city_code = City.city_code and City.city_code = BEST_DISTANCE.city1_code
AND BEST_DISTANCE.city2_code = "BAL") AS T
    -> GROUP BY T.country) AS TT
    -> WHERE City.country = TT.country AND BEST_DISTANCE.distance = TT.max_dis
    -> AND BEST_DISTANCE.city1_code = City.city_code AND BEST_DISTANCE.city2_code = "BAL") AS
TTT
    -> WHERE Student.City_Code = TTT.City_Code
    -> AND City.City_Code = Student.City_Code;
+-------+---------+---------+
| Fname | Lname   | Country |
+-------+---------+---------+
| Lisa  | Cheng   | USA     |
| Paul  | Gompers | CANADA  |
| Eric  | Tai     | CANADA  |
| Tracy | Kim     | CHINA   |
| Susan | Lee     | CHINA   |
| Eric  | Pang    | CHINA   |
| Bruce | Wilson  | UK      |
+-------+---------+---------+
7 rows in set (0.026 sec)


#Question 21
> SELECT Activity.Activity_name
    -> FROM Activity,
    -> (SELECT AVG(T1.distance) AS avg_dist, T1.ActID
    -> FROM (
    -> SELECT DISTINCT Participates_in.ActID, Participates_in.StuID, BEST_DISTANCE.distance
    -> FROM Student AS A, Participates_in, BEST_DISTANCE
    -> WHERE Participates_in.StuID = A.StuID AND A.City_Code = BEST_DISTANCE.city1_code
    -> AND BEST_DISTANCE.city2_code = "BAL") AS T1
    -> GROUP BY T1.ActID) AS T2,
    -> (SELECT MAX(TT.avg_dist) AS max_dist
    -> FROM
    -> (SELECT AVG(T.distance) AS avg_dist, T.ActID
    -> FROM (
    -> SELECT DISTINCT Participates_in.ActID, Participates_in.StuID, BEST_DISTANCE.distance
    -> FROM Student AS A, Participates_in, BEST_DISTANCE
    -> WHERE Participates_in.StuID = A.StuID AND A.City_Code = BEST_DISTANCE.city1_code
    -> AND BEST_DISTANCE.city2_code = "BAL") AS T
    -> GROUP BY T.ActID) AS TT) AS MAX
    -> WHERE T2.avg_dist = MAX.max_dist AND Activity.actid = T2.ActID;
+---------------+
| Activity_name |
+---------------+
| Canoeing      |
+---------------+
1 row in set (0.003 sec)


#Question 22
> SELECT DISTINCT Student.Fname, Student.Lname, Student.Age, Student.StuID
    -> FROM Student, Minor_in, Department,
    -> (SELECT Student.Stuid
    -> FROM Enrolled_in, Course, Student,
    -> (SELECT DISTINCT Member_of.FacID
    -> FROM Member_of, Department, Faculty
    -> WHERE Member_of.DNO= Department.DNO AND Department.Division = "EN" AND
Member_of.Appt_Type = "Primary"
    -> AND Faculty.Sex = "F" AND Faculty.FacID = Member_of.FacID AND Faculty.rank =
"Professor") as T
    -> WHERE Student.Stuid = Enrolled_in.Stuid and Enrolled_in.CID = Course.CID and
Course.Instructor = T.FacID) as T1
    -> WHERE Student.StuID = T1.StuID
    -> AND Student.StuID = Minor_in.Stuid
    -> AND Minor_in.DNO = Department.DNO
    -> AND Department.Division = "EN"
    -> AND Student.Sex = "F";
Empty set (0.018 sec)

#Question 23
> SELECT DISTINCT S.Fname, S.Lname, S.StuID
    -> FROM Student AS S
    -> WHERE not exists(
    -> (SELECT C.CID
    ->  FROM Course AS C, Faculty AS F
    ->  WHERE C.INstructor = F.FacID
    ->  AND F.Fname = "Paul"
    ->  AND F.Lname = "Smolensky")
    -> except
    -> (
    -> SELECT E.CID
    -> FROM Enrolled_in AS E, Course AS CC, Faculty as FF
    -> WHERE E.stuid = S.Stuid AND E.CID = CC.CID AND CC.Instructor = FF.FacID AND FF.Lname =
"Smolensky" AND FF.Fname = "Paul"));
Empty set (0.010 sec)

> SELECT DISTINCT A.StuID, A.Fname, A.Lname
    -> FROM Student AS A, Student as B, Student as C, Enrolled_in as AE, Enrolled_in as BE,
Enrolled_in as CE,Enrolled_in as CE1,
    -> City as BC, City as CC,VotedForElectioninUS as CV2020, VotedForElectioninUS as BV2020,
USCandidateFor as CAN2020B,
    -> USCandidateFor as CAN2020C,
    -> VotedForElectioninUS as CV2016, VotedForElectioninUS as BV2016,  USCandidateFor as
CAN2016B, USCandidateFor as CAN2016C
    -> WHERE A.Stuid = AE.Stuid AND B.Stuid = BE.Stuid AND C.Stuid = CE.Stuid AND B.Fname =
"Linda" AND B.Lname = "Smith"
    -> AND AE.CID = CE.CID  AND C.Stuid = CE1.StuID AND BE.CID = CE1.CID
    -> AND B.city_code = BC.city_code AND C.city_code = CC.city_code AND BC.state = CC.state
    -> AND CV2020.stuid = C.stuid AND BV2020.stuid = B.stuid AND CV2020.Year = "2020" AND
BV2020.Year = "2020"  AND CV2020.CandidateID = BV2020.CandidateID AND CV2020.CandidateID =
CAN2020C.CandidateID AND CAN2020C.Office = "President"
    -> AND BV2020.CandidateID = CAN2020B.CandidateID AND CAN2020B.Office = "President"
    -> AND CV2016.stuid = C.stuid AND BV2016.stuid = B.stuid AND BV2016.Year = "2016" AND
BV2020.Year = "2016" AND CV2016.CandidateID = BV2016.CandidateID AND CV2016.CandidateID =
CAN2016C.CandidateID AND CAN2016C.Office = "President"
    -> AND BV2016.CandidateID = CAN2016B.CandidateID AND CAN2016B.Office = "President"
    -> AND A.StuID != B.Stuid;
Empty set (0.002 sec)


#Question 25
> SELECT DISTINCT Course.CName
    -> FROM Student AS A, Student AS B, Member_of_club, Has_Allergy, Enrolled_in, Course
    -> WHERE A.StuID not IN (SELECT StuID FROM Member_of_club)
    -> AND A.StuID not IN (SELECT StuID FROM Has_Allergy)
    -> AND B.StuID IN (SELECT StuID FROM Has_Allergy)
    -> AND B.StuID IN(SELECT StuID FROM Member_of_club)
    -> AND B.StuID IN(SELECT WhoIsLiked FROM Likes WHERE A.StuID = Likes.WhoLikes)
    -> AND A.StuID = Enrolled_in.StuID
    -> AND Course.CID = Enrolled_in.CID;
+------------------------------+
| CName                        |
+------------------------------+
| EXPLORING THE INTERNET       |
| DATA STRUCTURES in JAVA      |
| MULTIMEDIA COMPUTING         |
| SUPERCOMPUTING               |
| DATABASE SYSTEMS             |
| COMPUTER SYSTEM FUNDAMENTALS |
| DISTRIBUTED SYSTEMS          |
| INTRODUCTION TO PROBABILITY  |
+------------------------------+
8 rows in set (2.200 sec)

#Question 26
> SELECT S.Fname, S.Lname, D.dorm_name, COUNT(*)
    -> FROM ConductViolation AS C, Student AS S, Dorm AS D, Lives_in AS L
    -> WHERE S.StuID = C.StuID AND D.dormid = L.Dormid AND L.Stuid = S.Stuid
    -> GROUP BY C.StuID;
+-------+----------+----------------------+----------+
| Fname | Lname    | dorm_name            | COUNT(*) |
+-------+----------+----------------------+----------+
| Linda | Smith    | Anonymous Donor Hall |        1 |
| Lisa  | Apap     | Fawlty Towers        |        1 |
| Mark  | Schwartz | Fawlty Towers        |        1 |
| Stacy | Prater   | Smith Hall           |        1 |
| Jun   | Han      | Fawlty Towers        |        1 |
+-------+----------+----------------------+----------+
5 rows in set (0.001 sec)

#Question 27
> SELECT SS.Fname, SS.Lname, Dorm.dorm_name ,MAX(T.cnt_violation) AS num_violations
    -> FROM Student AS SS,Dorm, Lives_in,
    -> (SELECT S.Fname, S.Lname,S.StuID, C.DormID, COUNT(*) AS cnt_violation
    -> FROM ConductViolation AS C, Student AS S
    -> WHERE S.StuID = C.StuID
    -> GROUP BY C.StuID) AS T
    -> WHERE SS.StuID = T.StuID AND SS.StuID = Lives_in.StuID AND Dorm.dormid =
Lives_in.DormID
    -> GROUP BY T.StuID;
+-------+----------+----------------------+----------------+
| Fname | Lname    | dorm_name            | num_violations |
+-------+----------+----------------------+----------------+
| Linda | Smith    | Anonymous Donor Hall |              1 |
| Lisa  | Apap     | Fawlty Towers        |              1 |
| Mark  | Schwartz | Fawlty Towers        |              1 |
| Stacy | Prater   | Smith Hall           |              1 |
| Jun   | Han      | Fawlty Towers        |              1 |
+-------+----------+----------------------+----------------+
5 rows in set (0.002 sec)


#Question 29
> SELECT T.CName, T.Dname
    -> FROM
    -> (SELECT COUNT(*) AS cnt, E.CID, Course.CName, Department.Dname
    -> FROM Student AS S, Enrolled_in AS E, ConductViolation AS C, Course, Department
    -> WHERE S.StuID = E.StuId AND S.Stuid = C.Stuid AND Course.CID = E.CID AND Course.DNO =
Department.DNO
    -> GROUP BY E.CID) AS T,
    -> (SELECT MAX(cnt) AS max_cnt
    -> FROM
    -> (SELECT COUNT(*) AS cnt, E.CID, Course.CName, Department.Dname
    -> FROM Student AS S, Enrolled_in AS E, ConductViolation AS C, Course, Department
    -> WHERE S.StuID = E.StuId AND S.Stuid = C.Stuid AND Course.CID = E.CID AND Course.DNO =
Department.DNO
    -> GROUP BY E.CID) AS T) AS MAX
    -> WHERE T.cnt = MAX.max_cnt;
+------------------+------------------+
| CName            | Dname            |
+------------------+------------------+
| DATABASE SYSTEMS | Computer Science |
+------------------+------------------+
1 row in set (0.036 sec)

#Question 30
> SELECT Activity.Activity_name
    -> FROM Activity,
    -> (SELECT ConductViolation.StuID,ConductViolation.Dormid, ConductViolation.Reason,
ConductViolation.Date,
    -> Participates_in.ActID
    -> FROM ConductViolation
    -> INNER JOIN Participates_in ON ConductViolation.StuID = Participates_in.StuID
    -> GROUP BY ActID
    -> HAVING COUNT(*)>3) AS T
    -> WHERE T.ActID = Activity.ActID;
Empty set (0.001 sec)

#Question 31
> SELECT S1.Fname, S1.Lname, S2.Fname, S2.Lname, U1.CandidateName,U2.CandidateName
    -> FROM Lives_in AS L1, Lives_in AS L2,VotedForElectioninUS AS V1, VotedForElectioninUS
AS V2,
    -> Student AS S1, Student AS S2, USCandidate AS U1, USCandidate AS U2, USCandidateFor as
F1, USCandidateFor as F2
    -> WHERE L1.stuid = V1.stuid AND L2.stuid = V2.stuid AND L1.dormid = L2.dormid AND
V1.Year = 2020 AND V2.Year = 2020
    -> AND V1.CandidateID != V2.CandidateID AND L1.stuid < L2.stuid AND L1.room_number =
L2.room_number
    -> AND S1.StuID = L1.stuid AND S2.StuID = L2.stuid
    -> AND V1.CandidateID = U1.CandidateId AND V2.CandidateID = U2.CandidateId
    -> AND U1.CandidateID = F1.CandidateId AND F1.Year = 2020 AND F1.Office = "President"
    -> AND U2.CandidateID = F2.CandidateID AND F2.Year = 2020 AND F2.Office = "President";
Empty set (0.002 sec)


#Question 32
> SELECT TTT.dorm_name, TTT.cnt
    -> FROM (
    -> SELECT Dorm.dorm_name,COUNT(TT.stuid) AS cnt
    -> FROM Dorm,
    -> (SELECT DISTINCT T.stuid, T.dormid
    -> FROM
    -> (SELECT Lives_in.stuid, Lives_in.dormid, VotedForElectioninUS.CandidateID,
VotedForElectioninUS.Year
    -> FROM Lives_in
    -> INNER JOIN VotedForElectioninUS ON Lives_in.Stuid = VotedForElectioninUS.stuid) AS T,
USCandidate, USCandidateFor
    -> WHERE T.CandidateID = USCandidate.CandidateId AND USCandidate.CandidateName = "Donald
Trump" AND USCandidateFor.CandidateID = USCandidate.CandidateID AND USCandidateFor.Office =
"President"
    -> AND T.Year = "2020") AS TT
    -> WHERE Dorm.dormid = TT.DormID
    -> GROUP BY Dorm.dorm_name) AS TTT,
    ->
    -> (SELECT MAX(TTT.cnt) AS max_cnt
    -> FROM
    -> (
    -> SELECT Dorm.dorm_name,COUNT(TT.stuid) AS cnt
    -> FROM Dorm,
    -> (SELECT DISTINCT T.stuid, T.dormid
    -> FROM
    -> (SELECT Lives_in.stuid, Lives_in.dormid, VotedForElectioninUS.CandidateID,
VotedForElectioninUS.Year
    -> FROM Lives_in
    -> INNER JOIN VotedForElectioninUS ON Lives_in.Stuid = VotedForElectioninUS.stuid) AS T,
USCandidate, USCandidateFor
    -> WHERE T.CandidateID = USCandidate.CandidateId AND USCandidate.CandidateName = "Donald
Trump"AND USCandidateFor.CandidateID = USCandidate.CandidateID AND USCandidateFor.Office =
"President"
    -> AND T.Year = "2020") AS TT
    -> WHERE Dorm.dormid = TT.DormID
    -> GROUP BY Dorm.dorm_name) AS TTT) AS MAX
    -> WHERE TTT.cnt = MAX.max_cnt
    -> ;
+---------------+-----+
| dorm_name     | cnt |
+---------------+-----+
| Fawlty Towers |   1 |
| Smith Hall    |   1 |
+---------------+-----+
2 rows in set (0.003 sec)


#Question 33
> SELECT T6.dorm_name,T6.cnt_vote, T6.cnt_stu, T6.percentage_vote
    -> FROM
    -> (SELECT MAX(T6.percentage_vote) AS max_percent
    -> FROM
    -> (SELECT TTT.dorm_name,TTT.cnt_vote,TTTTT.cnt_stu, ROUND(TTT.cnt_vote/TTTTT.cnt_stu,2)
AS percentage_vote
    -> FROM
    -> (SELECT Dorm.dorm_name,COUNT(TT.stuid) AS cnt_vote
    -> FROM Dorm,
    -> (SELECT DISTINCT T.stuid, T.dormid
    -> FROM
    -> (SELECT Lives_in.stuid, Lives_in.dormid, VotedForElectioninUS.CandidateID,
VotedForElectioninUS.Year
    -> FROM Lives_in
    -> INNER joIN VotedForElectioninUS ON Lives_in.Stuid = VotedForElectioninUS.stuid
    -> WHERE VotedForElectioninUS.Year = "2020") AS T, USCandidate,USCandidateFor
    -> WHERE T.CandidateID = USCandidate.CandidateId AND USCandidate.CandidateName = "Donald
Trump" AND
    -> USCandidateFor.CandidateID = USCandidate.CandidateID AND USCandidateFor.Office =
"President"
    -> AND USCandidateFor.Year = "2020") AS TT
    -> WHERE Dorm.dormid = TT.DormID
    -> GROUP BY Dorm.dorm_name) AS TTT
    ->
    -> INNER JOIN
    ->
    -> (SELECT TTTT.dorm_name, COUNT(TTTT.stuid) AS cnt_stu
    -> FROM (
    -> SELECT Dorm.dorm_name, Lives_in.stuid
    -> FROM Dorm, Lives_in
    -> WHERE Dorm.dormid = Lives_in.dormid ) AS TTTT
    -> GROUP BY TTTT.dorm_name) AS TTTTT
    -> ON TTT.dorm_name = TTTTT.dorm_name) AS T6) AS MAX,
    ->
    -> (SELECT TTT.dorm_name,TTT.cnt_vote,TTTTT.cnt_stu, TTT.cnt_vote/TTTTT.cnt_stu AS
percentage_vote
    -> FROM
    -> (SELECT Dorm.dorm_name,COUNT(TT.stuid) AS cnt_vote
    -> FROM Dorm,
    -> (SELECT DISTINCT T.stuid, T.dormid
    -> FROM
    -> (SELECT Lives_in.stuid, Lives_in.dormid, VotedForElectioninUS.CandidateID,
VotedForElectioninUS.Year
    -> FROM Lives_in
    -> INNER JOIN VotedForElectioninUS on Lives_in.Stuid = VotedForElectioninUS.stuid
    -> WHERE VotedForElectioninUS.Year = "2020") AS T, USCandidate,USCandidateFor
    -> WHERE T.CandidateID = USCandidate.CandidateId AND USCandidate.CandidateName = "Donald
Trump"
    -> AND USCandidateFor.CandidateID = USCandidate.CandidateID AND USCandidateFor.Office =
"President"
    -> AND USCandidateFor.Year = "2020") AS TT
    -> WHERE Dorm.dormid = TT.DormID
    -> GROUP BY Dorm.dorm_name) AS TTT
    -> INNER JOIN
    -> (SELECT TTTT.dorm_name, COUNT(TTTT.stuid) AS cnt_stu
    -> FROM (
    -> SELECT Dorm.dorm_name, Lives_in.stuid
    -> FROM Dorm, Lives_in
    -> WHERE Dorm.dormid = Lives_in.dormid ) AS TTTT
    -> GROUP BY TTTT.dorm_name) AS TTTTT
    -> ON TTT.dorm_name = TTTTT.dorm_name) AS T6
    -> WHERE ROUND(T6.percentage_vote,2) = MAX.max_percent;
+------------+----------+---------+-----------------+
| dorm_name  | cnt_vote | cnt_stu | percentage_vote |
+------------+----------+---------+-----------------+
| Smith Hall |        1 |       6 |          0.1667 |
+------------+----------+---------+-----------------+
1 row in set (0.002 sec)


#Question 34
> SELECT S1.Fname, S1.Lname, S1.Age, C1.CandidateName, C1.Party, V1.Year AS Year1,
C2.CandidateName, C2.Party,
    -> V2.Year AS Year2
    -> FROM VotedForElectioninUS AS V1, VotedForElectioninUS AS V2,
    -> Student AS S1, USCandidate AS C1, USCandidate AS C2,USCandidateFor as U1,
USCandidateFor as U2
    -> WHERE V1.Stuid = V2.Stuid AND V1.Year = 2016 AND V2.Year = 2020
    -> AND V1.CandidateID != V2.CandidateID
    -> AND S1.Stuid = V1.Stuid AND C1.CandidateID = V1.CandidateId
    -> AND C2.CandidateId = V2.CandidateId
    -> AND C1.CandidateId = U1.CandidateId AND U1.Year = 2016 AND U1.Office = "President"
    -> AND C2.CandidateID = U2.CandidateID AND U2.Year =2020 AND U2.Office = "President";
+-------+---------+------+-----------------+------------+-------+---------------+------------
+-------+
| Fname | Lname   | Age  | CandidateName   | Party      | Year1 | CandidateName | Party
| Year2 |
+-------+---------+------+-----------------+------------+-------+---------------+------------
+-------+
| Linda | Smith   |   18 | Hillary Clinton | Democrat   |  2016 | Joe Biden     | Democrat
|  2020 |
| David | Shieber |   20 | Donald Trump    | Republican |  2016 | Joe Biden     | Democrat
|  2020 |
| Stacy | Prater  |   18 | Hillary Clinton | Democrat   |  2016 | Donald Trump  | Republican
|  2020 |
+-------+---------+------+-----------------+------------+-------+---------------+------------
+-------+
3 rows in set (0.001 sec)

#Question 35
> SELECT DISTINCT S.Fname, S.Lname, C.State
    -> FROM VotedForElectioninUS AS V1, VotedForElectioninUS AS V2, USCandidate AS C1,
    -> USCandidate AS C2, Student AS S, City AS C, USCandidateFor as U1, USCandidateFor as U2
    -> WHERE V1.Stuid = V2.Stuid AND V1.Year != V2.Year AND
    -> V1.CandidateId = C1.CandidateId AND V2.CandidateId = C2.CandidateId
    -> AND U1.CandidateID = C1.CandidateID AND U1.Year = V1.Year AND U1.Office = "President"
    -> AND U2.CandidateID = C2.CandidateID AND U2.Year = V2.Year AND U2.Office = "President"
    -> AND C1.Party != C2.Party
    -> AND S.Stuid = V1.Stuid AND S.City_Code = C.city_code;
+-------+---------+-------+
| Fname | Lname   | State |
+-------+---------+-------+
| Stacy | Prater  | MD    |
| David | Shieber | NY    |
+-------+---------+-------+
2 rows in set (0.009 sec)


#Question 36
> SELECT DISTINCT Student.Fname, Student.Lname FROM Worked_at, Studied_Abroad, Student
    -> WHERE Position LIKE '%intern%' AND (Worked_at.Start_Date < Studied_Abroad.End_Date
    -> OR Worked_at.End_Date > Studied_Abroad.Start_Date) AND Worked_at.StuID =
Studied_Abroad.StuID
    -> AND Student.Stuid = Worked_at.Stuid;
Empty set (0.012 sec)

#Question 37

> SELECT S.Fname, S.Lname
    -> FROM Student AS S,
    -> (SELECT W1.Stuid
    -> FROM Worked_at AS W1, Worked_at AS W2
    -> WHERE W1.Position LIKE '%intern%' AND W2.Position LIKE '%intern%'
    -> AND W1.Stuid = W2.Stuid
    -> AND (W1.Start_Date <=W2.End_Date OR W1.End_Date>=W2.Start_Date)
    -> AND (W1.Company != W2.Company OR W1.Position != W2.Position)) AS T
    -> WHERE S.Stuid = T.Stuid
    -> GROUP BY T.Stuid
    -> HAVING COUNT(T.Stuid) >=2;
Empty set (0.043 sec)
```

```
#Question 40
> SELECT W.Company, W.Start_Date, W.End_Date, S.Fname, S.Lname,
    -> DATEDIFF( W.End_Date,W.Start_Date)+1 AS duration
    -> FROM Worked_at AS W, Student AS S
    -> WHERE W.Position like '%intern%'
    -> AND S.Stuid = W.Stuid;
+-----------+------------+------------+--------+-------+----------+
| Company   | Start_Date | End_Date   | Fname  | Lname | duration |
+-----------+------------+------------+--------+-------+----------+
| Microsoft | 2019-05-01 | 2019-07-20 | Shiela | Jones |       81 |
| Apple     | 2019-04-10 | 2019-08-10 | Derek  | Lee   |      123 |
+-----------+------------+------------+--------+-------+----------+
2 rows in set (0.011 sec)


#Question 41
> SELECT T1.Fname, T1.Lname, T1.total_duration, T1.Company
    -> FROM
    -> (SELECT max(T1.total_duration) as max_duration
    -> FROM
    -> (SELECT T.Company, T.Start_Date, T.End_Date, T.Fname, T.Lname, SUM(duration) as
total_duration
    -> FROM
    -> (SELECT DISTINCT W.Company, W.Start_Date, W.End_Date, S.Fname, S.Lname,S.Stuid,
    -> DATEDIFF( W.End_Date,W.Start_Date)+1 AS duration
    -> FROM Worked_at AS W, Student AS S
    -> WHERE W.Position like '%intern%'
    -> AND S.Stuid = W.Stuid
    -> ) AS T
    -> GROUP BY T.stuid, T.Company) as T1) AS MAX
    -> ,
    ->
    -> (SELECT T.Company, T.Start_Date, T.End_Date, T.Fname, T.Lname, SUM(duration) as
total_duration
    -> FROM
    -> (SELECT DISTINCT W.Company, W.Start_Date, W.End_Date, S.Fname, S.Lname,S.Stuid,
    -> DATEDIFF( W.End_Date,W.Start_Date)+1 AS duration
    -> FROM Worked_at AS W, Student AS S
    -> WHERE W.Position like '%intern%'
    -> AND S.Stuid = W.Stuid
    -> ) AS T
    -> GROUP BY T.stuid, T.Company) as T1
    -> WHERE T1.total_duration = MAX.max_duration;
+-------+-------+----------------+---------+
| Fname | Lname | total_duration | Company |
+-------+-------+----------------+---------+
| Derek | Lee   |            123 | Apple   |
+-------+-------+----------------+---------+
1 row in set (0.001 sec)


#Question 42
> SELECT DISTINCT S.Fname, S.Lname, D.dorm_name
    -> FROM Lives_in AS L1, Lives_in AS L2, Has_Pet AS H2, Pet AS P2, Has_Allergy AS A1,
    -> Student AS S, Dorm AS D
    -> WHERE L2.Dormid = L1.Dormid AND H2.StuId = L2.Stuid AND H2.Petid = P2.Petid AND
    -> P2.PetType = A1.Allergy AND L1.Stuid = A1.Stuid AND S.Stuid = L1.Stuid AND
    -> D.Dormid = L1.Dormid;
+-------+-------+----------------------+
| Fname | Lname | dorm_name            |
+-------+-------+----------------------+
| Linda | Smith | Anonymous Donor Hall |
| Lisa  | Apap  | Fawlty Towers        |
+-------+-------+----------------------+
2 rows in set (0.017 sec)


#Question 43
> SELECT DISTINCT S2.Fname, S2.Lname,S1.Fname, S1.Lname, P3.petname
    -> FROM Student AS S1, Student AS S2, Student AS S3,
    -> Lives_in AS L1, Lives_in AS L3, Has_Pet AS H3, Pet AS P3, Loves
    -> WHERE L1.Dormid = L3.Dormid AND L1.Room_number = L3.Room_number
    -> AND S1.stuid = L1.stuid AND S3.stuid = L3.stuid
    -> AND S3.stuid = H3.stuid AND H3.Petid = P3.petid
    -> AND P3.Petname = S2.Fname AND
    -> S2.Stuid IN (SELECT WhoIsLoved FROM Loves WHERE S1.stuID = Loves.WhoLoves ) AND
    -> S1.Stuid IN (SELECT WhoIsLoved FROM Loves WHERE S2.stuID = Loves.WhoLoves );
Empty set (0.032 sec)



#Question 44
> SELECT S.Fname, S.Lname, S.Age, T.PetName, T.PetAge
    -> FROM Has_Pet AS H,Student AS S,
    -> (SELECT MAX(P.Petage) AS max_age
    -> FROM Pet AS P
    -> WHERE P.PetType = "Dog") AS MAX,
    -> (SELECT *
    -> FROM Pet AS P
    -> WHERE P.PetType = "Dog") AS T
    -> WHERE T.PetAge = MAX.max_age
    -> AND T.Petid = H.Petid
    -> AND S.Stuid = H.Stuid;
+---------+--------+------+---------+--------+
| Fname   | Lname  | Age  | PetName | PetAge |
+---------+--------+------+---------+--------+
| Charles | Norris |   18 | Mike    |      2 |
| Paul    | Brody  |   18 | Mike    |      2 |
| Lisa    | Cheng  |   21 | Bruno   |      2 |
+---------+--------+------+---------+--------+
3 rows in set (0.015 sec)

#Question 45
> SELECT DISTINCT S1.Fname, S1.Lname,D1.dorm_name, L1.room_number, S2.Fname, S2.Lname,
D2.dorm_name, L2.room_number
    -> FROM Student AS S1, Student AS S2, Has_Pet AS H1, Has_Pet AS H2,Pet AS P1, Pet AS P2,
    -> Dorm AS D1, Dorm AS D2, Lives_in AS L1, Lives_in AS L2
    -> WHERE S1.stuid = H1.stuid AND S2.stuid =H2.stuid
    -> AND H1.Petid = P1.PetID AND H2.Petid = P2.Petid
    -> AND ((P1.PetType = 'Dog' AND P2.PetType = 'Cat') OR (P1.PetType = 'Cat' AND P2.PetType
= 'Parrot')
    -> or (P1.PetType = 'Cat' AND P2.PetType = 'Dog') OR(P1.PetType = 'Parrot' AND
P2.PetType='Cat'))
    -> AND S1.stuid < S2.stuid
    -> AND S1.stuid = L1.stuid AND S2.stuid = L2.stuid
    -> AND L1.dormid = D1.dormid AND L2.dormid = D2.dormid;
+-------+-------+----------------------+-------------+---------+--------+--------------------
--+-------------+
| Fname | Lname | dorm_name            | room_number | Fname   | Lname  | dorm_name
| room_number |
+-------+-------+----------------------+-------------+---------+--------+--------------------
--+-------------+
| Linda | Smith | Anonymous Donor Hall |         105 | Charles | Norris | Grad Student Asylum
|         211 |
| Linda | Smith | Anonymous Donor Hall |         105 | Paul    | Brody  | Fawlty Towers
|         208 |
| Linda | Smith | Anonymous Donor Hall |         105 | Lisa    | Cheng  | Anonymous Donor
Hall |         211 |
+-------+-------+----------------------+-------------+---------+--------+--------------------
```

```
--+-------------+
3 rows in set (0.022 sec)

#Question 46
 SELECT  COUNT(DISTINCT L1.room_number) AS num_occupied_room, D.dorm_name, D.Student_capacity
    -> FROM Lives_in AS L1, Dorm AS D
    -> WHERE L1.dormid = D.dormid
    -> GROUP BY L1.dormid;
+-------------------+----------------------+------------------+
| num_occupied_room | dorm_name            | Student_capacity |
+-------------------+----------------------+------------------+
|                 4 | Smith Hall           |               85 |
|                 1 | Grad Student Asylum  |              256 |
|                 2 | Anonymous Donor Hall |              128 |
|                 1 | Bud Jones Hall       |              116 |
|                 1 | University Hovels    |               40 |
|                 9 | Fawlty Towers        |              355 |
|                 6 | Dorm-plex 2000       |              400 |
+-------------------+----------------------+------------------+
7 rows in set (0.001 sec)

#Question 47
> SELECT IFNULL(T1.num_pet_room,0) as num_pet_room, Dorm.dorm_name
    -> FROM
    -> (SELECT COUNT(DISTINCT T.room_number) AS num_pet_room, T.dormid
    -> FROM
    -> (SELECT DISTINCT L1.stuid, L1.dormid, L1.room_number, H1.Petid
    -> FROM Lives_in AS L1
    -> INNER JOIN Has_Pet AS H1
    -> ON L1.stuid = H1.stuid) AS T
    -> GROUP BY T.dormid) as T1
    -> RIGHT JOIN
    -> Dorm
    -> ON T1.dormid = Dorm.dormid;
+--------------+----------------------+
| num_pet_room | dorm_name            |
+--------------+----------------------+
|            0 | Smith Hall           |
|            0 | Bud Jones Hall       |
|            1 | Fawlty Towers        |
|            0 | Dorm-plex 2000       |
|            2 | Anonymous Donor Hall |
|            0 | University Hovels    |
|            1 | Grad Student Asylum  |
+--------------+----------------------+
7 rows in set (0.011 sec)


#Question 48
> SELECT T2.dorm_name,IFNULL(T1.num_pet,0) AS num_pet,IFNULL(num_pet_room/num_room,0) AS
percent_room
    -> FROM
    -> (SELECT  COUNT(DISTINCT Lives_in.room_number) AS num_pet_room,Lives_in.dormid,
COUNT(DISTINCT Has_Pet.petid) AS num_pet
    -> FROM Has_Pet, Lives_in, Dorm
    -> WHERE Has_Pet.stuid = Lives_in.stuid
    -> GROUP BY dormid ) AS T1
    -> RIGHT JOIN
    -> (
    -> SELECT COUNT(DISTINCT Lives_in.room_number) AS num_room,
Lives_in.dormid,Dorm.dorm_name
    -> FROM Lives_in, Dorm
    -> WHERE Dorm.dormid = Lives_in.dormid
    -> GROUP BY Lives_in.dormid
    ->  ) AS T2
    -> ON T1.dormid = T2.dormid;
+----------------------+---------+--------------+
| dorm_name            | num_pet | percent_room |
+----------------------+---------+--------------+
| Smith Hall           |       0 |       0.0000 |
| Grad Student Asylum  |       1 |       1.0000 |
| Anonymous Donor Hall |       2 |       1.0000 |
| Bud Jones Hall       |       0 |       0.0000 |
| University Hovels    |       0 |       0.0000 |
| Fawlty Towers        |       2 |       0.1111 |
| Dorm-plex 2000       |       0 |       0.0000 |
+----------------------+---------+--------------+
7 rows in set (0.009 sec)


#Question 49
> SELECT T2.avg_hr_played
    -> FROM
    -> (SELECT MAX(T1.avg_hr_played) AS max_hr
    -> FROM
    -> (SELECT D.DName, AVG(T.Hours_played) AS avg_hr_played
    -> FROM Department AS D,
    -> (SELECT  V.GType, P.StuID, P.GameID, P.Hours_played, S.Major
    -> FROM Video_Games AS V, Plays_Games AS P, Student AS S
    -> WHERE V.GType = 'Role-playing game'
    -> AND V.GameID = P.GameID
    -> AND S.StuID = P.Stuid ) AS T
    -> WHERE T.Major = D.DNO
    -> GROUP BY D.DNO ) AS T1) AS MAX,
    ->
    -> (SELECT D.DName, AVG(T.Hours_played) AS avg_hr_played
    -> FROM Department AS D,
    -> (SELECT  V.GType, P.StuID, P.GameID, P.Hours_played, S.Major
    -> FROM Video_Games AS V, Plays_Games AS P, Student AS S
    -> WHERE V.GType = 'Role-playing game'
    -> AND V.GameID = P.GameID
    -> AND S.StuID = P.Stuid ) AS T
    -> WHERE T.Major = D.DNO
    -> GROUP BY D.DNO ) AS T2
    -> WHERE T2.avg_hr_played = MAX.max_hr;
+---------------+
| avg_hr_played |
+---------------+
|      100.0000 |
+---------------+
1 row in set (0.053 sec)
```

```
1.
-------------------------------------------------------------------------------------
STUDENT   | StuID |    Lname  |    Fname  | Age | Sex | Major | Advisor | City_Code |
----------|-------|-----------|-----------|-----|-----|-------|---------|-----------|
          |  _a   |   P._x    |   P._c    |     |     |       |         |    _z     |
          |  _b   |   P._y    |   P._d    |     |     |       |         |    _z     |
          |       |           |           |     |     |       |         |           |

----------------------------------------
LOVES      | WhoLoves    | WhoIsLoved  |
-----------|-------------|-------------|
           |      _a     |   _e        |
           |      _b     |   _f        |


----------------------------------------
LIKES      | WhoLikes    | WhoIsLiked  |
-----------|-------------|-------------|
           |     _a      |   _b        |
           |     _b      |   _a        |
------------------------------------
|        Conditions                |
|----------------------------------|
|                                  |
| _a<_b AND ¬(_e = _b AND _a = _f) |

4.
-------------------------------------------------------------------------------------
STUDENT   | StuID |    Lname  |    Fname  | Age | Sex | Major | Advisor | City_Code |
----------|-------|-----------|-----------|-----|-----|-------|---------|-----------|
          |  _s   |     P._x  |   P._y    |     |     |       |         |           |
          |       |           |           |     |     |       |         |           |
          |       |           |           |     |     |       |         |           |
-----------------------------------------------
LIVES_IN |   StuID |  DormID |   Room_number  |
---------|---------|---------|----------------|
         |    _s   |         |                |
         |         |         |                |
         |         |         |                |
-----------------------------------------------
CAR_OWNERSHIP     | StuID       | CarID       |
------------------|-------------|-------------|
                  |   _s        | _c          |
                  |   _s        | ¬_c         |


5.
-------------------------------------------------------------------------------------
STUDENT   | StuID |    Lname  |    Fname  | Age | Sex | Major | Advisor | City_Code |
----------|-------|-----------|-----------|-----|-----|-------|---------|-----------|
          |   _s  |   P._x    | P._y      |     |     |       |         |           |
          |       |           |           |     |     |       |         |           |
          |       |           |           |     |     |       |         |           |

-----------------------------------------------
LIVES_IN |   StuID |  DormID |   Room_number  |
---------|---------|---------|----------------|
         |     _s  |         |                |
         |         |         |                |
         |         |         |                |

-----------------------------------------------
CAR_OWNERSHIP     | StuID       | CarID       |
------------------|-------------|-------------|
       ¬          |    _s       |             |
                  |             |             |

----------------------------------------
HAS_PET    | StuID       | PetID       |
-----------|-------------|-------------|
           |   _s        |             |
           |             |             |
           |             |             |

13.
-------------------------------------------------------------------------------------
STUDENT   | StuID |    Lname   |    Fname   | Age | Sex | Major | Advisor | City_Code |
----------|-------|-----------|-----------|-----|-----|-------|---------|-----------|
          |   _a  |   P._x    |    P._y   |     |     |       |         |           |
          |   _b  |           |           |     |     |       |         |           |
          |   _d  |           |           |     |     |       |         |           |
          |   _e  |           |           |     |     |       |         |     _h    |

---------------------------------------
ENROLLED_IN | StuID   |   CID  | Grade |
------------|--------|--------|-------|
            |   _a   |  _c    |       |
            |   _b   |  _c    |       |
            |   _b   |  _k    |       |
            |   _d   |  _k    |       |


-----------------------------------------------
LIVES_IN |   StuID |  DormID |   Room_number  |
---------|---------|---------|----------------|
         |   _d    |    _f   |      _g        |
         |   _e    |    _f   |      _g        |
         |         |         |                |

--------------------------------------------------------------------------------
CITY |   City_code |  City_name |  State |   Country |  Latitude |  Longitude  |
-----|-------------|------------|--------|-----------|-----------|-------------|
     |     _h      |            | PA     |           |           |             |

------------------------------------------------------------------
VotedForElection   | StuID       |  Candidate_ID |    Year       |
-------------------|-------------|---------------|----------------
                   |       _e    |      _j       |     2020      |
                   |             |               |               |
                   |             |               |               |
------------------------------------------------------------------
US_Candidate       |Candidate_ID |Candidate_Name |    Party      |
-------------------|-------------|---------------|----------------
                   |    _j       | Donald Trump  |               |
                   |             |               |               |
                   |             |               |               |
--------------------------------------------
|        Conditions                        |
|------------------------------------------|
|                                          |
|  _a!=_b AND _b!=_d  AND _d!= _e          |


22.
-------------------------------------------------------------------------------------
STUDENT   | StuID |    Lname   |    Fname   | Age | Sex | Major | Advisor | City_Code |
----------|-------|-----------|-----------|-----|-----|-------|---------|-----------|
          |  _a   |   P._b    |   P._c    |P._d |  F  |       |         |           |
          |       |           |           |     |     |       |         |           |
          |       |           |           |     |     |       |         |           |
---------------------------
MINOR_IN |  StuID |  DNO  |
---------|--------|-------|
         |   _a   | _e    |

------------------------------------------------------------------
DEPARMENT |  DNO  |Division| DName | Room   | Building  | DPhone |
----------|-------|--------|-------|--------|-----------|--------|
          |  _e   |  EN    |       |        |           |        |
          |  _h   |  EN    |       |        |           |        |
          |       |        |       |        |           |        |
---------------------------------------
ENROLLED_IN | StuID  |  CID   | Grade |
------------|--------|--------|-------|
            |  _a    |   _f   |       |
            |        |        |       |
            |        |        |       |

--------------------------------------------------------------------------------
COURSE   |  CID  |    CName     |Credits| Instructor | Days  | Hours |   DNO   |
---------|-------|--------------|-------|------------|-------|-------|---------|
         |  _f   |              |       |   _g       |       |       |         |
         |       |              |       |            |       |       |         |
         |       |              |       |            |       |       |         |

--------------------------------------------------------------------------
FACULTY  | FacID | Lname  | Fname | Rank    | Sex | Phone | Room | Building |
---------|-------|--------|-------|---------|-----|-------|------|----------|
         |  _g   |        |       |Professor|  F  |       |      |          |
         |       |        |       |         |     |       |      |          |
         |       |        |       |         |     |       |      |          |
--------------------------------------------
MEMBER_OF   | FacID  |   DNO   | Appt_Type |
------------|--------|---------|-----------|
            |  _g    |  _h     |  Primary  |
            |        |         |           |
            |        |         |           |

24.
-------------------------------------------------------------------------------------
STUDENT   | StuID |    Lname  |    Fname  | Age | Sex | Major | Advisor | City_Code |
----------|-------|-----------|-----------|-----|-----|-------|---------|-----------|
          |  P._a |   P._b    |  P._c     |     |     |       |         |           |
          |  _c   |           |           |     |     |       |         |   _e      |
          |  _d   |    Smith  |   Linda   |     |     |       |         |   _f      |

---------------------------------------
ENROLLED_IN | StuID  |  CID   | Grade |
------------|--------|--------|-------|
            |  _a    |   _j   |       |
            |  _c    |   _j   |       |
            |  _c    |   _k   |       |
            |  _d    |   _k   |       |
--------------------------------------------------------------------------------
CITY |   City_code | City_name |  State |   Country |  Latitude |  Longitude  |
-----|-------------|------------|--------|-----------|-----------|-------------|
     |     _e      |            |   _g   |           |           |             |
     |     _f      |            |   _g   |           |           |             |
------------------------------------------------------------------
VotedForElection   | StuID      |  Candidate_ID |     Year      |
-------------------|-------------|---------------|----------------
                   |   _d        |    _h         |   2016        |
                   |   _c        |    _h         |   2016        |
                   |   _d        |    _i         |   2020        |
                   |   _c        |    _i         |   2020        |
------------------------------------------------------------------------------------
US_Candidate_For   |Candidate_ID | Office     |  Location      |  Year             |
-------------------|-------------|------------|----------------|-------------------|
                   |  _h         | President  |                |  2016             |
                   |  _i         | President  |                |  2020             |
                   |             |            |                |                   |
--------------------
|        Conditions |
|-------------------|
|                   |
|  _a!=_c AND _c!=_d|

26.
-------------------------------------------------------------------------------------
STUDENT   | StuID |    Lname    |    Fname    | Age | Sex | Major | Advisor | City_Code |
----------|-------|-----------|-----------|-----|-----|-------|---------|-----------|
          |    _a |  _b       |   _c      |     |     |       |         |           |
          |       |           |           |     |     |       |         |           |
          |       |           |           |     |     |       |         |           |

------------------------------------------------------------------------------------
CONDUCT_VIOLATION  | StuID        | DormID     |  Reason        |  Date             |
-------------------|-------------|------------|----------------|-------------------|
                   |    _a       |            |                |   _f              |
                   |             |            |                |                   |

-----------------------------------------------
LIVES_IN |   StuID |  DormID |   Room_number  |
---------|---------|---------|----------------|
         |   _a    |   _d    |                |
         |         |         |                |
         |         |         |                |
-----------------------------------------------------------
DORM   |  DormID  | Dorm_name | Student_capacity | Gender  |
-------|---------|-----------|------------------|---------|
       |   _d    |  _e       |                  |         |
       |         |           |                  |         |
       |         |           |                  |         |

-----------------------------------------------------------------------------
RESULT    |  Fname       |    Lname    |   Dorm_name  | Num_violation| StuID      |
----------|------------|-----------|-------------|--------------|-----------|
          | P._c       |     P._b  |    P._e     | P.CNT.ALL._f | G._a      |
          |            |           |             |              |           |
          |            |           |             |              |           |
          |            |           |             |              |           |

31.
-------------------------------------------------------------------------------------
STUDENT   | StuID |    Lname    |    Fname    | Age | Sex | Major | Advisor | City_Code |
----------|-------|-----------|-----------|-----|-----|-------|---------|-----------|
          |  _a   |    _c     |  _e       |     |     |       |         |           |
          |  _b   |    _d     |  _f       |     |     |       |         |           |
          |       |           |           |     |     |       |         |           |

-----------------------------------------------
LIVES_IN |   StuID |  DormID |   Room_number  |
---------|---------|---------|----------------|
         |   _a    |  _g     |    _r          |
         |   _b    |  _g     |    _r          |
         |         |         |                |
------------------------------------------------------------------
VotedForElection   | StuID        |  Candidate_ID |     Year       |
-------------------|-------------|---------------|----------------
                   |    _a       |     _h        |    2020       |
                   |    _b       |     _i        |    2020       |
                   |             |               |               |
------------------------------------------------------------------
US_Candidate       |Candidate_ID |Candidate_Name |    Party      |
-------------------|-------------|---------------|----------------
                   |    _h       |     _j        |               |
                   |    _i       |     _k        |               |
                   |             |               |               |
------------------------------------------------------------------------------------
US_Candidate_For   |Candidate_ID | Office     |  Location      |  Year             |
-------------------|-------------|------------|----------------|-------------------|
                   |   _h        | President  |                |   2020            |
                   |   _i        | President  |                |   2020            |
                   |             |            |                |                   |
--------------------------------------------------------------------------------------------
RESULT    |   FName_1   |  LName_1  |Candidate_Name_1 | FName_2    | LName_2| Candidate_Name_2
----------|------------|-----------|-----------------|------------|--------|------------------
   P.     |   _e       |  _c       |    _j           |   _f       |  _d    |     _k
          |            |           |                 |            |        |
          |            |           |                 |            |        |
          |            |           |                 |            |        |
--------------------
|        Conditions |
|-------------------|
| _a<_b AND _h!=_i  |
|                   |


34.

-------------------------------------------------------------------------------------
STUDENT   | StuID |    Lname  |    Fname  | Age | Sex | Major | Advisor | City_Code |
----------|-------|-----------|-----------|-----|-----|-------|---------|-----------|
          | _a    |  _b       |  _c       | _d  |     |       |         |           |
          |       |           |           |     |     |       |         |           |
          |       |           |           |     |     |       |         |           |

------------------------------------------------------------------
VotedForElection   | StuID       |  Candidate_ID |    Year       |
-------------------|-------------|---------------|----------------
                   |   _a        |    _e         |   2016        |
                   |   _a        |    _f         |   2020        |
                   |             |               |               |

------------------------------------------------------------------
US_Candidate       |Candidate_ID |Candidate_Name |    Party      |
-------------------|-------------|---------------|----------------
                   |   _e        |  _g           |    _h         |
                   |   _f        |  _i           |    _j         |
                   |             |               |               |
------------------------------------------------------------------------------------
US_Candidate_For   |Candidate_ID | Office     |  Location      |  Year             |
-------------------|-------------|------------|----------------|-------------------|
                   |   _e        | President  |                |   2016            |
                   |   _f        | President  |                |   2020            |
                   |             |            |                |                   |
----------------------------------------------------------------------------------------------
--------
RESULT    |   FName    |  LName    |Age |Candidate_Name_2016 |Political_Party_2016
|Candidate_Name_2020
----------|------------|-----------|----|--------------------|---------------------|----------
---------
   P.     |   _c       |  _b       | _d |   _g               |  _h                 | _i
          |            |           |    |                    |                     |
          |            |           |    |                    |                     |
          |            |           |    |                    |                     |
          --------------------------
          | Political_Party_2020    |
          |-------------------------|
          |   _j                    |
          |                         |
          |                         |
          |                         |
--------------------
|        Conditions |
|-------------------|
|                   |
| _e != _f          |

35.
-------------------------------------------------------------------------------------
STUDENT   | StuID |    Lname  |    Fname  | Age | Sex | Major | Advisor | City_Code |
----------|-------|-----------|-----------|-----|-----|-------|---------|-----------|
          | _a    |  _b       |    _c     |     |     |       |         |   _d      |
          |       |           |           |     |     |       |         |           |
          |       |           |           |     |     |       |         |           |
------------------------------------------------------------------
VotedForElection   | StuID       |  Candidate_ID |    Year       |
-------------------|-------------|---------------|----------------
                   |  _a         |   _i          |    _j         |
                   |  _a         |   _k          |    _l         |
                   |             |               |               |
------------------------------------------------------------------
US_Candidate       |Candidate_ID |Candidate_Name |    Party      |
-------------------|-------------|---------------|----------------
                   |   _i        |               |    _m         |
                   |   _k        |               |    _n         |
                   |             |               |               |
------------------------------------------------------------------------------------
US_Candidate_For   |Candidate_ID | Office     |  Location      |  Year             |
-------------------|-------------|------------|----------------|-------------------|
                   |   _i        | President  |                |   _j              |
                   |   _k        | President  |                |   _l              |
                   |             |            |                |                   |
--------------------------------------------------------------------------------
CITY |   City_code |  City_name | State  |   Country |  Latitude |  Longitude  |
-----|-------------|------------|--------|-----------|-----------|-------------|
     |    _d       |            |  _e    |           |           |             |
---------------------------------------------------------------
RESULT    |   Fname    |  Lname    |  State      |            |
----------|------------|-----------|-------------|------------|
  P.      |    _c      |  _b       |   _e        |            |
          |            |           |             |            |
          |            |           |             |            |
          |            |           |             |            |
--------------------
|        Conditions |
|-------------------|
|                   |
| _j != _l, _m!=_n  |


42.
-------------------------------------------------------------------------------------
STUDENT   | StuID |    Lname  |    Fname  | Age | Sex | Major | Advisor | City_Code |
----------|-------|-----------|-----------|-----|-----|-------|---------|-----------|
          | _a    |   _b      |  _c       |     |     |       |         |           |
          |       |           |           |     |     |       |         |           |
          |       |           |           |     |     |       |         |           |
-----------------------------------------------
LIVES_IN |   StuID |  DormID |   Room_number  |
---------|---------|---------|----------------|
```

	_a	_d	
	_e	_d	

HAS_PET	StuID	PetID
	_e	_f

PET	PetID	PetName	PetType	PetAge	PetSex
	_f		_g		

HAS_ALLERGY	StuID	AllergyName
	_a	_g

DORM	DormID	Dorm_name	Student_capacity	Gender
	_d	_h		

RESULT	Fname	Lname	Dorm_name	
P.	_c	_b	_h	

43.

STUDENT	StuID	Lname	Fname	Age	Sex	Major	Advisor	City_Code
	_a	_j	_k					
	_d	_e	_f					

LOVES	WhoLoves	WhoIsLoved
	_a	_d
	_d	_a

LIVES_IN	StuID	DormID	Room_number
	_a	_g	_h
	_i	_g	_h

HAS_PET	StuID	PetID
	_i	_m

PET	PetID	PetName	PetType	PetAge	PetSex
	_m	_f			

```
 |        Conditions |
 |-------------------|
 |                   |
 | _a != _i          |
---------------------------------------------------------------------------
RESULT     |  FName1     |  LName2    |  PetName     |  FName      |  LName     |
-----------|-------------|------------|--------------|-------------|------------
           |   _f        |  _e        |  _f          |  _k         |  _j        |
           |             |            |              |             |            |
           |             |            |              |             |            |
           |             |            |              |             |            |

49.
/* List the max amount of time on average a department's student spend on Role Playing video
Games*/
-----------------------------------------------------------------|
VIDEO_GAMES      |  GameID        |  GName       |  GType            |
-----------------|----------------|--------------|-------------------|
                 |   _a           |              |Role Playing Games|
                 |                |              |                   |
-----------------------------------------------------------
PLAYS_GAMES      |  StuID         |  GameID      |Hours_Played|
-----------------|----------------|--------------|------------|
                 |   _b           | _a           |  _c         |
                 |                |              |             |
-------------------------------------------------------------------------------------
STUDENT    | StuID  |    Lname    |    Fname    | Age | Sex | Major  | Advisor | City_Code |
-----------|--------|-------------|-------------|-----|-----|--------|---------|-----------|
           | _b     |             |             |     |     | _d     |         |           |
           |        |             |             |     |     |        |         |           |
           |        |             |             |     |     |        |         |           |
------------------------------------------------------------------
DEPARMENT  |  DNO   |Division| DName  | Room    | Building   | DPhone  |
-----------|--------|--------|--------|---------|------------|---------|
           | _d     |        |        |         |            |         |
           |        |        |        |         |            |         |
           |        |        |        |         |            |         |
-------------------------------------------
RESULT     |  DNO        |Hrs_Played          |
-----------|-------------|--------------------|
           |   G._d      | P.MAX(AVG.ALL._c)  |
           |             |                    |
           |             |                    |
           |             |                    |
```