```
Database Systems Project 1 Solution

SQL> set echo on
SQL> @query1-16
SQL> select c1.dept_code || c1.course# as course_id, title
  2  from courses c1, classes c2
  3  where c1.dept_code = c2.dept_code and c1.course# = c2.course#
  4  and c2.year = 2016 and c2.semester = 'Spring';

COURSE_ID                                  TITLE
------------------------------------------ --------------------
CS432                                      database systems
CS240                                      data structure
Math221                                    calculus I
CS532                                      database systems

SQL>
SQL> @query2-16
SQL> select B#, firstname, lastname, gpa from students where B# in
  2  ((select B# from enrollments where classid in
  3  (select classid from classes where dept_code = 'CS'))
  4  intersect
  5  (select B# from enrollments where classid in
  6  (select classid from classes where dept_code = 'Math')));

B#   FIRSTNAME       LASTNAME               GPA
---- --------------- --------------- ----------
B001 Anne            Broder                3.17

SQL>
SQL> @query3-16
SQL> column dept_code format a9
SQL> select dept_code, course# from courses
  2  where (dept_code, course#) not in
  3  (select dept_code, course# from classes where semester = 'Fall' and year = 2015);

DEPT_CODE    COURSE#
--------- ----------
Biol             425
CS               532
CS               240
Math             221
CS               432
CS               552

6 rows selected.

SQL>
SQL> @query4-16
SQL> select B#, firstname, lastname, gpa from students
  2  where status in ('MS', 'PhD') and B# in
  3  (select B# from enrollments where lgrade in ('B-', 'C+', 'C', 'C-', 'D', 'F'));

no rows selected

SQL>
SQL> @query5-16
SQL> select firstname || ' ' || lastname as name from students where B# not in
  2  (select B# from enrollments where lgrade = 'A');

NAME
------------------------------
Terry Buttler
```

```
Barbara Callan
Jack Smith
Tom Baker

SQL>
SQL> @query6-16
SQL> column student_B# format a10
SQL> column faculty_B# format a10
SQL> select s.B# student_B#, f.B# faculty_B# from students s, faculty f
  2  where (s.B#, f.B#) in (select s1.B#, f1.B# from students s1, enrollments e,
  3  classes c, faculty f1 where s1.B# = e.B# and e.classid = c.classid and
  4  c.faculty_B# = f1.B# and s.deptname <> f.deptname);

STUDENT_B# FACULTY_B#
---------- ----------
B001       B103
B004       B104
B004       B101
B006       B102
B007       B105

SQL>
SQL> @query7-16
SQL> column dept_code format a9
SQL> select dept_code, course# from courses where (dept_code, course#) in
  2  (select dept_code, course# from classes group by dept_code, course#
  3  having count(*) = (select max(count(*))
  4  from classes group by dept_code, course#));

DEPT_CODE    COURSE#
--------- ----------
Math             314
CS               432

SQL> @query8-16
SQL> column dept_code format a9
SQL> select classid, dept_code, course#, limit - class_size as seats_available
  2  from classes where year = 2016 and semester = 'Spring' and limit > class_size;

CLASS DEPT_CODE    COURSE# SEATS_AVAILABLE
----- --------- ---------- ---------------
c0005 CS               240               1
c0001 CS               432               1
c0006 CS               532               1

SQL> @query9a-16
SQL> select * from students s where B# in (select B#
  2  from enrollments group by B# having count(*) > 3);

B#   FIRSTNAME       LASTNAME        STATUS            GPA EMAIL
---- --------------- --------------- ---------- ---------- --------------------
BDATE     DEPT
--------- ----
B001 Anne            Broder          junior           3.17 broder@bu.edu
17-JAN-90 CS


SQL> @query9b-16
SQL> select * from students s where (select count(*)
  2  from enrollments where B# = s.B#) > 3;

B#   FIRSTNAME       LASTNAME        STATUS            GPA EMAIL
---- --------------- --------------- ---------- ---------- --------------------
BDATE     DEPT
--------- ----
```

```
B001 Anne            Broder          junior           3.17 broder@bu.edu
17-JAN-90 CS


SQL> @query10-16
SQL> select * from classes c where dept_code = 'CS' and year = 2016
  2  and semester = 'Spring' and (select count(*) from enrollments
  3  where classid = c.classid) < 3;

CLASS DEPT_CODE    COURSE#      SECT#       YEAR SEMESTER      LIMIT CLASS_SIZE
----- --------- ---------- ---------- ---------- -------- ---------- ----------
FACULTY_B#
----------
c0001 CS               432          1       2016 Spring           35         34
B101


SQL> @query11-16
SQL> select B#, firstname from students s where not exists
  2  (select * from courses c where dept_code = 'CS' and
  3  course# like '4%' and not exists
  4  (select e.* from enrollments e, classes c1
  5  where e.B# = s.B# and e.classid = c1.classid and
  6  c1.dept_code = c.dept_code and c1.course# = c.course#));

B#   FIRSTNAME
---- ---------------
B001 Anne
B003 Tracy
B004 Barbara

SQL> @query12-16
SQL> select title from courses where (dept_code, course#) in
  2  ((select dept_code, course# from classes where classid in
  3  (select classid from enrollments where B# = 'B001')) minus
  4  (select dept_code, course# from classes where
  5  classid in (select classid from enrollments where B# = 'B002')));

TITLE
--------------------
data structure
database systems
database systems

SQL> @query13-16
SQL> select firstname from students where B# in
  2  (select e.B# from enrollments e, classes c
  3  where e.classid = c.classid and (dept_code, course#) in
  4  (select c1.dept_code, c1.course# from classes c1, enrollments e1
  5  where e1.B# = 'B005' and c1.classid = e1.classid));

FIRSTNAME
---------------
Jack
Terry
Anne

SQL> @query14-16
SQL> select year, semester, dept_code, course# from classes
  2  group by year, semester, dept_code, course# having count(*) >= 2;

      YEAR SEMESTER DEPT_CODE    COURSE#
---------- -------- --------- ----------
      2015 Fall     Math             314
```

```
SQL> @query15-16
SQL> select B#, firstname from students where B# in
  2  (select e.B# from enrollments e, grades g where e.lgrade = g.lgrade and
  3  g.ngrade in (select max(ngrade) from enrollments e1, grades g1
  4  where e1.classid = e.classid and e1.lgrade = g1.lgrade));

B#   FIRSTNAME
---- ---------------
B001 Anne
B002 Terry
B003 Tracy
B004 Barbara
B006 Terry
B007 Becky

6 rows selected.

SQL> @query16-16
SQL> select c.dept_code, c.course#, c.title,
  2  nvl(e.lgrade, 'to be assigned') as grade
  3  from courses c, classes c1, enrollments e where c.dept_code = c1.dept_code
  4  and c.course# = c1.course# and e.B# = 'B003' and c1.classid = e.classid;

DEPT_CODE    COURSE# TITLE                GRADE
--------- ---------- -------------------- --------------
CS               432 database systems     I
CS               432 database systems     A
CS               240 data structure       to be assigned

SQL> @query17-16
SQL> select c.dept_code, c.course#, c.title from courses c, classes c1
  2  where c.title like '%systems%' and c.dept_code = c1.dept_code
  3  and c.course# = c1.course# and not exists
  4  (select * from students s where s.gpa > 3.25 and not exists
  5  (select * from enrollments e where e.B# = s.B# and e.classid = c1.classid));

no rows selected

SQL> @query18-16
SQL> (select s.B#, s.firstname, sum(credits)
  2  from students s, courses c, course_credit cc, classes c1, enrollments e
  3  where s.B# = e.B# and c.dept_code = c1.dept_code and
  4  c.course# = c1.course# and c.course# = cc.course# and c1.classid = e.classid
  5  and e.lgrade is not null group by s.B#, s.firstname) union
  6  (select B#, firstname, 0 from students where B# not in
  7  (select B# from enrollments));

B#   FIRSTNAME       SUM(CREDITS)
---- --------------- ------------
B001 Anne                    23
B002 Terry                    4
B003 Tracy                    8
B004 Barbara                  8
B005 Jack                     3
B006 Terry                    3
B007 Becky                    4
B008 Tom                      0

8 rows selected.

SQL> @query19-16
SQL> select avg(temp.totalcredits) from (select e.B#, sum(credits) totalcredits
  2  from enrollments e, courses c, course_credit cc, classes c1
  3  where e.classid = c1.classid and c.dept_code = c1.dept_code
  4  and c.course# = c1.course# and c.course# = cc.course#
```

```
  5  and e.lgrade is not null group by e.B#) temp;

AVG(TEMP.TOTALCREDITS)
----------------------
            7.57142857

SQL> @query20-16
SQL> ((select e.B#, sum(g.ngrade)/count(*) as cgpa
  2  from enrollments e, grades g where e.lgrade = g.lgrade and g.ngrade is not null
  3  group by e.B#) union
  4  (select B#, null from students where B# not in (select B# from enrollments)))
  5  order by cgpa desc;

B#         CGPA
---- ----------
B008
B003          4
B006          4
B007          4
B001 3.16666667
B002          3
B005          3
B004       2.65

8 rows selected.

SQL> spool off
```