1. [11pts] For all users whose last name is ‘Bednar’, list their user_id and email address. Expected result row(s): 3
   a) [8pts] SQL Query:
      ```sql
      select user_id, email
      from User
      where last_name = 'Bednar';
      ```
   b) [3pts] Result:
      ```text
      user_id, email
      '1060', 'deven.bednar@hotmail.com'
      '223', 'callie.bednar@gmail.com'
      '293', 'amie.bednar@gmail.com'
      ```

2. [11pts] For those students majored in ‘ART’ and have taken the course CS222 (cno ‘222’ dept ‘CS’) with a grade no less than 98, list their user_id, first_name and last_name. Expected result row(s): 3
   a) [8pts] SQL Query:
      ```sql
      select User.user_id, User.first_name, User.last_name
      from User, Student, Takes
      where User.user_id = Student.user_id
      AND Student.major = 'ART'
      AND Takes.user_id = Student.user_id
      AND Takes.dept = 'CS' AND Takes.cno = '222'
      AND Takes.grade>=98;
      ```
   b) [3pts] Result:
      ```text
      user_id, first_name, last_name
      '628', 'Marley', 'Spinka'
      '1527', 'Lorenzo', 'Lubowitz'
      '1348', 'Delpha', 'Denesik'
      ```
3. [11pts] Find the student who has taken the course CS122A (cno '122A' dept 'CS') in year 2016 and Fall semester with the highest grade, list his/her first_name, last_name and grade received. Expected result row(s): 1

a) [8pts] SQL Query:

```sql
select distinct User.first_name, User.last_name, Takes.grade
from User, Student, Takes, Class
where User.user_id = Takes.user_id
AND User.user_id = Student.user_id
AND Takes.class_no = Class.class_no
AND Takes.cno = Class.cno
AND Takes.dept = Class.dept
AND Class.dept = 'CS' AND Class.cno = '122A'
AND Class.year = '2016' AND Class.term = 'Fall'
ORDER by Takes.grade DESC
LIMIT 1;
```

Extra point version

```sql
select distinct User.first_name, User.last_name, Takes.grade
from User, Student, Takes, Class
where User.user_id = Takes.user_id
AND User.user_id = Student.user_id
AND Takes.class_no = Class.class_no
AND Takes.cno = Class.cno
AND Takes.dept = Class.dept
AND Class.dept = 'CS' AND Class.cno = '122A'
AND Class.year = '2016' AND Class.term = 'Fall'
AND Takes.grade in
    (select MAX(Takes.grade)
     from Takes, Class
     where Takes.class_no = Class.class_no AND Takes.cno = Class.cno
               AND Takes.dept = Class.dept
               AND Class.dept = 'CS' AND Class.cno = '122A'
               AND Class.year = '2016' AND Class.term = 'Fall');
```
b) [3pts] Result:
first_name, last_name, grade
'Barbara', 'Ernser', '96.00'

4. [11pts] For all professors (Instructor whose title is ‘Professor’) who have offered courses with cno ‘222’ or ‘122A’ in ‘CS’ dept, list their first_name and last_name. Expected result row(s): 2
a) [8pts] SQL Query:
select distinct User.first_name, User.last_name
from User, Instructor, Offers, Class
where User.user_id = Instructor.user_id
AND Instructor.user_id = Offers.user_id
AND Instructor.title = 'Professor'
AND Offers.class_no = Class.class_no AND Offers.cno = Class.cno AND Offers.dept = Class.dept
AND (Class.cno = '122A' OR Class.cno = '222')
AND Class.dept='CS';
b) [3pts] Result:
first_name, last_name
'Gillian', 'Emmerich'
'Frida', 'Paucek'

5. [11pts] For all professors (Instructor whose title is ‘Professor’) who have offered both course CS132 (cno ‘132’ dept ‘CS’) and course CS223 (cno ‘223’ dept ‘CS’), list their first_name and last_name. Expected result row(s): 1
a) [8pts] SQL Query:
select distinct User.first_name, User.last_name
from User, Instructor, Offers, Class
where User.user_id = Instructor.user_id
AND Instructor.user_id = Offers.user_id
AND Instructor.title = 'Professor'
AND Offers.class_no = Class.class_no AND Offers.cno = Class.cno AND Offers.dept = Class.dept
AND Class.cno = '132'
AND Class.dept='CS'
AND (User.first_name, User.last_name) in
   (select distinct User.first_name, User.last_name
from User, Instructor, Offers, Class
where User.user_id = Instructor.user_id
AND Instructor.user_id = Offers.user_id
AND Instructor.title = 'Professor'
AND Offers.class_no = Class.class_no AND Offers.cno = Class.cno AND Offers.dept = Class.dept
AND Class.cno = '223'
AND Class.dept = 'CS');
b) [3pts] Result:
first_name, last_name
'Alek', 'Von'

6. [11pts] For all question posts (i.e., post kind ‘Question’) whose popularity is at least 95 and that have been directly replied to by the same user, list the post_id and the user_id of the users who posted them. (Expected result row(s): 3)
   a) [8pts] SQL Query:
   select distinct p1.post_id, p1.user_id
   from Post as p1, Post as p2
   where p1.post_id = p2.regard_to_post_id
   AND p1.kind = 'Question'
   AND p1.popularity >= 95
   AND p1.user_id = p2.user_id
   b) [3pts] Result:
   post_id, user_id
   '12597', '1690'
   '12674', '228'
   '13562', '1783'

7. [11pts] For all students majoring in ‘ART’ who have taken at least one class offered by the ‘CS’ dept in 2017 Summer, list their user_id, first_name and last_name. (Expected result row(s): 4)
   a) [8pts] SQL Query:
   select distinct User.user_id, User.first_name, User.last_name
   from User, Student, Takes, Class
   where User.user_id = Student.user_id
   AND Student.user_id = Takes.user_id
   AND Takes.dept = 'CS'
   AND Takes.cno = '223'
   AND Takes.year = 2017
AND Student.major = 'ART'
AND Takes.dept = 'CS'
AND Takes.class_no = Class.class_no AND Takes.cno = Class.cno AND Takes.dept = Class.dept
AND Class.year = 2017 AND Class.term='Summer';
b) [3pts] Result:
user_id, first_name, last_name
'1239','Savannah','Nitzsche'
'1900','Dean','Bruen'
'1435','Franco','Russel'
'506','Jo','Bode'

8. [11pts] For all classes of course CS122A (cno ‘122A’ and dept ‘CS’) that have an assignment named “Assignment 3”, list their years and terms in ascending order (first ordered by year, then by term within year). (Expected result row(s): 5)
a) [8pts] SQL Query:
select distinct year, term
from Class, Assignment
where Class.dept = 'CS' AND Class.cno = '122A'
AND Class.class_no = Assignment.class_no
AND Class.cno = Assignment.cno
AND Class.dept = Assignment.dept
AND Assignment.name = 'Assignment 3'
order by year, term;
b) [3pts] Result:
year, term
'2012','Summer'
'2012','Fall'
'2013','Winter'
'2016','Spring'
'2017','Fall'

9. [12pts] For all assignments completed by students for all classes of course CS122A (cno ‘122A’ dept ‘CS’) offered in year 2017 and term Fall, list top 5 highest scores along with the assign_id and assignment
a) [8pts] SQL Query:

```
select distinct Does.grade, Assignment.assign_id, Assignment.name
from User, Student, Class, Assignment, Does
where User.user_id = Student.user_id
AND Class.cno = '122A' AND Class.dept = 'CS' AND Class.year = '2017' AND Class.term = 'Fall'
AND Assignment.class_no = Class.class_no AND Assignment.cno = Class.cno AND Assignment.dept = Class.dept
AND User.user_id = Does.user_id AND Does.assign_id = Assignment.assign_id
order by Does.grade desc
limit 5;
```

extra point version:

```
select distinct Does.grade, Assignment.assign_id, Assignment.name
from User, Student, Class, Assignment, Does,
    (select distinct Does.grade as grade
    from Class, Assignment, Does
    where Class.cno = '122A' AND Class.dept = 'CS' AND Class.year = '2017' AND Class.term = 'Fall'
    AND Assignment.class_no = Class.class_no AND Assignment.cno = Class.cno AND Assignment.dept = Class.dept
    AND Assignment.assign_id = Does.assign_id
    order by Does.grade DESC
    limit 5) TopGrade
where User.user_id = Student.user_id
AND Class.cno = '122A' AND Class.dept = 'CS' AND Class.year = '2017' AND Class.term = 'Fall'
AND Assignment.class_no = Class.class_no AND Assignment.cno = Class.cno AND Assignment.dept = Class.dept
AND User.user_id = Does.user_id AND Does.assign_id = Assignment.assign_id
AND Does.grade = TopGrade.grade
ORDER by grade Desc;
```
b) [4pts] Result:
grade, assign_id, name
'93.00','152','Assignment 0'
'90.00','155','Assignment 3'
'89.00','154','Assignment 2'
'88.00','152','Assignment 0'
'84.00','153','Assignment 1'

extra point version
'93.00','152','Assignment 0'
'90.00','155','Assignment 3'
'89.00','154','Assignment 2'
'88.00','152','Assignment 0'
'84.00','153','Assignment 1'
'84.00','154','Assignment 2'