Homework - 2

Important note: <u>All homework is to be done individually</u> -- you are not to work with others on it.
Total Points: 20
1 point per Question

Part 1

a. Can a relation schema have two primary keys? (yes or no)
   ■ no, it must have at most one primary key, but may contain several attributes.
b. Fill in the blank: every operation of relation algebra produces _____ as output.
   ■ relation/table
c. When union is applied to two tables, the tables must be compatible. In what sense do they have to be compatible?

   _____
   ■ the schema of relations must match exactly (i.e. the columns)
d. Answer the question "what are the IDs of instructors who teach CS-138" using Relational Algebra. Use TEACHES relation
   ■ Project ID (Select course_id = 'CS-138')(TEACHES))
e. Answer the question "which departments have a budget of over $60,000" using Relational Algebra. Use DEPARTMENT relation
   ■ Project Department (select budget > 60000 (DEPARTMENT))
f. In many programming languages there are functions that will append one list to another list. Compare the 'union' operation of relational algebra with the append function by giving one way in which they are different.

   _____
   ■ in many programming languages, the union will concatenate the two objects the user has specified and append it to the end and allows for duplicates, whereas in relational algebra, duplicates are removed. additionally, the type of "objects" being appended must match (for most languages) whereas the schema must match in relational algebra.

Part 2
Use hospital.sql to answer following SQL queries.
.read hospital.sql

2. what are the first and last names of the female patients?
   • select first_name, last_name from patient where sex = 'F'
1. what are the patient numbers and wards of all patients?
   • select patient_no, ward from patient
2. what are the first and last names of patients are in either ward 6 or ward 7?
   • select last_name from patient where ward == 6 or ward == 7;
3. 4.what are the last names of patients that are either in ward 3 or are male?
   • select last_name from patient where ward == 3 or sex == 'M'

Part 3

Use census-summary.sql (uploaded under datasets module) to answer following SQL queries.
.read census-summary.sql

show the age of the males in the data set
- select distinct age from census where sex = 'Male';

1.

3. show all columns for the people with a usid between 100 and 120
    - select * from census where usid > 100 and usid < 120;
4. show the workclass and education of people under 20
    - select workclass, education from census where age < 20;
5. show all columns for people over 80
    - select * from census where age > 80
6. show the sex of people who are over 80 and have never married
    - select sex from census where age > 80 and marital_status = 'Never_married"
    - select distinct sex from census where age > 80 and marital_status = 'Never_married"

7. what 'relationship' values appear in the data o
        select distinct relationship from census;

7. what are the minimum and maximum number of years of education

select min(education_num) from census;
select max(education_num) from census;

NOTE: we can also combine the two into a single query:
select min(education_num),max(education_num) from census;
8. which native countries end with "a"

- select distinct native_country from census where native_country like "%a";
9. which native countries do not have "a" anywhere in their name

    - select distinct native_country from census where native_country NOT like '%a%';

10. what is the average age of people who have never worked?

- select avg(age) from census where workclass ="Never_worked";