Assignment was due by 2021-09-28 15:30:00

COMP 421 Midterm 1 Fall 2021 Section 001

Note: There are a total of 100 points on this exams.

Don't panic!

You have 75 minutes to finish the exam.

- You *should* stay in full screen mode.
    - A <ctrl-f> find will give you a warning, which is OK
- You must hand this midterm in on time.
    - Points removed for late submissions.
- Absolutely no exams will be accepted after the end of class.
    - Only your **first** submission will be accepted/graded.
    - Avoid accidental submissions. Fill in your name when you are ready to submit.

I recommend that you have several pieces of scrap paper to doodle notes on during the exam. I *strongly* recommend you read the whole exam and begin with questions you know how to solve quickly. Some questions will be harder or take longer than others; don't spend all your time on one question worth only a few points! Also, don't worry if you don't have time to solve every question - that's expected.

Consider this midterm **closed book**.
You can **NOT** reference other online homeworks, worksheets, etc.
You can use your notes or other things printed out. They should be on paper as you may not switch screens after starting the exam.

You **MAY NOT** Google for anything, You **MAY NOT** leave this website, you **MAY NOT** visit any websites, and you **MAY NOT** copy from a friend. Do not paste information into your midterm unless you know it came from your midterm. You **MUST NOT** not receive help from anyone.

If you do not know the origin of material you should not paste it into this exam. All material pasted into this exam must originate from this exam. This implies, but is not limited to, copying from previous assignments, copying from text messages, or copying from **any** website.

You **MUST** use the Google Chrome browser.

The instruction team will **not** answer questions about course content, SQL syntax, etc. We will only deal with issues related to exam implementation.

If your browser hangs, for example because of a bad SQL query, simply kill the page and refresh. It *should* restore all your work even if it doesn't re-evaluate all answers, color-highlight boxes, etc.

You may **NOT** leave before you submit your exam. When you submit your exam you must enter the code displayed on the screen at the front of the class or given to you by ARS.`

You **must not** use your computer or phone in the classroom after you submit your exam.

The browser will change input box color green to indicate correctness. A black or red box indicates an incorrect answer.

Note that HTML select statements with drop-downs are simple multiple choice questions. No highlighting of correct answers are done for select questions.

Green highlight should just assist you. If you believe your answer is correct and the input box did not turn green, continue on. Per the syllabus, highlighting is simply an aide not a guarantee. **Note:** For database queries that are applied to two databases, two green lights are required to get any credit for the question.

Election Database Schema

Here are the tables you'll find for the database used in the midterm. Your queries will be run against two versions of the database. One of the databases will be much smaller and only contain a subset of the information. You should not consider this database information to be accurate to the current administration.

```
CREATE TABLE IF NOT EXISTS States
          (abbrev char(2) PRIMARY KEY,
           statename char(20),  -- May include territori
```

```
                population integer)

CREATE TABLE IF NOT EXISTS Politicians
           (bioid char(20),
            firstname char(20),
            lastname char(20),
            birthday date, -- YYYY-MM-DD format string

            gender char(1),
            PRIMARY KEY(bioid))

CREATE TABLE IF NOT EXISTS Terms
   (termid INTEGER PRIMARY KEY AUTOINCREMENT,
    termtype char(20), -- Type of term elected; rep, sen,
    startdate date,
    enddate date,
    party char(20), -- Political party affiliation
    how char(20),  -- Different ways to get into an offic
    bioid char(20),
    -- Presidents & vice president aren't elected from di
    -- Senators aren't elected from districts
    district integer,  -- Null for prez, viceprez, or ser
    state char(2),     -- Null for prez and viceprez
    FOREIGN KEY(bioid) REFERENCES Politicians(bioid))''')
```

The following scratch space can be used to help develop and test queries against a database described above. The database used by the exam grader will be different.

Execute

NOTE: The database has been attenuated. For example, this database only has the original 13 states in the States relation. The Politicians relation only

has the politicians born since the last century.
The grader will use a different database.

Questions For a total of 100 points

SQL Queries 75 points

In this section, you will write SQL queries for the president and congressman schema described at the beginning of the exam. Your queries will be tested immediately against two different databases. If your queries output matches the expected output, the displayed answers will be outlined in green. Your actual score will be determined when your query is tested against a different database but green feedback should mean that you are on track to receive full credit.

The following scratch space can be used to help develop and test queries against these two databases if you want. Nothing about the scratch space contributes to any points on the midterm and anything in the scratch space is ignored.

Scratch space

Execute

State.7: Write a query that returns the alphabetically sorted last state name.

Execute 2.5 points Minimize Output

List.5: List all the state names.

Execute 2.5 points Minimize Output

How.Many.1: How many different first names for politicians are there in the database?

Execute 5 points Minimize Output

Relational_Algebra_Query.6: Translate this relational algebra expression into SQL: $\pi_{lastname}\sigma_{birthday>1985-00-00}Politicians$

Execute 5 points Minimize Output

Birthday.10: List the first name and last name of all politicians born within the year of 1980.

Execute 10 points Minimize Output

More.Than.One.9: What is the first and last name of politicians who came into office from two or more parties.

Execute 10 points Minimize Output

Name.2: List the first name of politicians that have a second character of a and have a third character of `l`.

Execute 10 points Minimize Output

Current.9: What are the first name and last name of the politicians who started serving a new term in the House of Representatives this calendar year?

Execute 10 points Minimize Output

Number.Senators.1: Return the state names between A and G, inclusive, and the number of senators elected in 2021. If no senators were elected in 2021 from a state between A and G, inclusive, return a count of Null for that state.

Execute 10 points Minimize Output

Positions.Held.12: What are the first name, last name, and the type of term held for all politicians who held three or more different term types?
The query result should be a set (not a multi-set) of tuples presented in the order of the last name, first name, then the type of term held

Execute 10 points Minimize Output

Chapter Reading Review 25 points

Advantage.DBMS.1: According to the book, which of the following are **NOT** one of the main benefits of using a DBMS?

5 points

ER_model.1: Suppose you are constructing an ER model to capture information about students, teachers, courses, books required for course, and who is taking each course. Each student can take multiple courses, each course is taught by one and only one teacher, and each teacher can teach multiple courses.

Which of these is most likely true of an ER model that captures this situation?

5 points

SQL_construct.1: What SQL construct enables the definition of a relation?

5 points

Relational_Algebra.1: What does the SQL relation algebra operator π do?

5 points

Cardinality.1: How many distinct tuples are in a relation instance with cardinality 4 and degree of 3?

5 points
