CPSC 321: Week 5 Assignments
Due Tuesday, October 3

Part 1: Reading Assignment. Read the following sections in the textbook and then answer the questions below.
- Ch. 3: 3.7.2, 3.7.3, 3.7.4
- Ch. 4: 4.2.1, 4.2.2, 4.2.3

1. In your own words describe the differences between the WHERE and HAVING clauses in SQL queries.

2. Create an example query based on your schema for HW3 that involves a GROUP BY with both a WHERE and HAVING clause. Describe the impact the WHERE and HAVING clauses individually have on the query result.

3. Briefly describe in your own words the difference between a view and a stored procedure. Also compare views and stored procedures to constructs in programming languages. That is, do typical programming languages provide similar capabilities as views and stored procedures (which constructs are most similar)?

Part 2: More Database Queries. Using the Database Schema from Homework 4, answer the following queries. Note that you may need to populate your tables with additional data to test your answers to the following queries.

1. Describe what the purpose of the following query is and write an equivalent query using the “JOIN ON” syntax. Note that when describing the query, don’t recite the SQL; instead, state the intent of the query.

   ```sql
   SELECT DISTINCT p.name, p.area
   FROM Province p, City c
   WHERE c.province = p.name AND c.population > 1000;
   ```

2. Describe what the purpose of the following query is and write an equivalent query using the “JOIN USING” syntax.

   ```sql
   SELECT c1.name, c1.country
   FROM City c1, City c2
   WHERE c1.name = c2.name AND c1.country <> c2.country AND
   c1.population > c2.population;
   ```

3. Write an SQL query that finds the GDP, inflation, and total population of each country. Let a country’s population be the total population of all cities in that country.
4. Write an SQL query to find the name, area, and total population of provinces with a population over 1,000,000 people. Let the population of a province be the total population of each city in the province.

5. Write an SQL query that orders countries by their size in terms of the number of cities they have.

6. Write an SQL query that orders countries by their total area. Let a country’s area be the sum of each of its provinces’ areas.

7. Write an SQL query that finds countries containing one or more provinces with at least 5 cities. Your query should report the name of each country at most once.

8. Write a view called assoc_borders that includes “completes” the borders relation such that if a row (c1, c2, len) is in borders, then both (c1, c2, len) and (c2, c1, len) is in assoc_borders. In other words, the assoc_borders relation is the associative version of the borders relation.

9. Write an SQL query that finds for each country, the average GDP and inflation of each of its bordering countries. Your query should return the countries ordered by (from lowest to highest) the average GDP followed by the average inflation of their bordering countries. Note you should use your assoc_borders relation in your query.

**Turn in** the contents of your tables as shown by MySQL (e.g., using `SELECT * FROM ...`), your SQL queries, and the result of executing these queries on your tables. Like in HW 4, include all of your SQL code in a single `hw5.sql` script file. Be sure to include a cover sheet and a design document in your hard copy and submit your SQL script file to the course submission page.