University of Toronto
CSC343, Summer 2019

SQL: Set Operations

Schema

Student(<u>sID</u>, surName, firstName, campus, email, cgpa)

Course(<u>dept, cNum</u>, name, breadth)

Offering(<u>oID</u>, dept, cNum, term, instructor)

Took(<u>sID, oID</u>, grade)

Offering[dept, cNum] $\subseteq$ Course[dept, cNum]

Took[sID] $\subseteq$ Student[sID]

Took[oID] $\subseteq$ Offering[oID]

Questions

1. Answer each of the following questions with an arithmetic expression.

   Suppose a row occurs n times in table R and m times in table S.

   (a) Using bag semantics, how many times will it occur in table $R \cup S$?

   (b) Using bag semantics, how many times will it occur in table $R \cap S$?

   (c) Using bag semantics, how many times will it occur in table $R - S$?

2. Use a set operation to find all terms when Jepson and Suzuki were both teaching. Include every occurrence of a term from the result of both operands.

3. Find the sID of students who have earned a grade of 85 or more in some course, or who have passed a course taught by Atwood. Ensure that no sID occurs twice in the result.

4. Find all terms when csc369 was not offered.

5. Make a table with two columns: oID and results. In the results column, report either "high" (if that offering had an average grade of 80 or higher), or "low" (if that offering had an average under 60). Offerings with an average in between will not be included.

   Hints:

   - Surprise surprise, use a set operation.
   - You can use the SELECT clause to put a literal value into a column. For example:
     `SELECT 'high' as results ....`