University of Toronto
CSC343, Fall 2015

CDF IDs:
Names:

Set Operations: Solutions

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. Assuming bag semantics, compute the following:

   (a) $\{1, 1, 1, 3, 7, 7, 8\} \cup \{1, 5, 7, 7, 8, 8\}$

   (b) $\{1, 1, 1, 3, 7, 7, 8\} \cap \{1, 5, 7, 7, 8, 8\}$

   (c) $\{1, 1, 1, 3, 7, 7, 8\} - \{1, 5, 7, 7, 8, 8\}$

   Solution:

   Remember that these are sets, and so order doesn't matter. The questions were presented in order to make it easier on your eyeballs.

   (a) $\{1, 1, 1, 3, 7, 7, 8\} \cup \{1, 5, 7, 7, 8, 8\} = \{1, 1, 1, 3, 7, 7, 8, 1, 5, 7, 7, 8, 8\} = \{1, 1, 1, 1, 3, 5, 7, 7, 7, 7, 8, 8, 8\}$

   (b) $\{1, 1, 1, 3, 7, 7, 8\} \cap \{1, 5, 7, 7, 8, 8\} = \{1, 7, 7, 8\}$

   (c) $\{1, 1, 1, 3, 7, 7, 8\} - \{1, 5, 7, 7, 8, 8\} = \{1, 1, 3\}$

2. Write a query to find all terms when Jepson and Suzuki were both teaching. Include duplicates of the same term.

   Solution:

   ```
   (select Term from Offering where instructor = 'Suzuki')
   intersect all
   (select Term from Offering where instructor = 'Jepson');
   ```

Output:

```
 term
-------
 20089
 20081
 20081
(3 rows)
```

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. Use views for the intermediate steps.

   Solution:

   ```
   create view High as
   (select sid from took where grade >= 85);

   create view HighAtwood as
   (select sid
   from Took, Offering
   where Took.oid = Offering.oid and instructor = 'Atwood' and grade >= 50);

   (select * from high)
   union
   (select * from highAtwood);
   ```

   Output:

   ```
    sid
   -------
    98000
    99132
    99999
      157
   (4 rows)
   ```

4. Find all terms when csc369 was not offered.

   Solution:

   ```
   (select term
   from Offering)
   except
   (select term
   from Offering
   where dept = 'csc' and cNum = 369);
   ```

   Output:

   ```
    term
   -------
    20081
    20089
   ```