Set Operations: Solutions

Schema

Student(sID, surName, firstName, campus, email, cgpa)
Course(dept, cNum, name, breadth)
Offering(oID, dept, cNum, term, instructor)
Took(sID, oID, grade)

Offering[dept, cNum] ⊆ Course[dept, cNum]
Took[sID] ⊆ Student[sID]
Took[oID] ⊆ Offering[oID]

Questions

1. Assuming bag semantics, compute the following:
   (a) \{1, 1, 1, 3, 7, 7, 8\} ∪ \{1, 5, 7, 7, 8, 8\}

   (b) \{1, 1, 1, 3, 7, 7, 8\} ∩ \{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\} ∪ \{1, 5, 7, 7, 8, 8\} = \{1, 1, 1, 3, 5, 7, 7, 7, 7, 7, 7, 7, 8, 8, 8\}

(b) \{1, 1, 1, 3, 7, 7, 8\} ∩ \{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:
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:

<table>
<thead>
<tr>
<th>sid</th>
</tr>
</thead>
<tbody>
<tr>
<td>98000</td>
</tr>
<tr>
<td>99132</td>
</tr>
<tr>
<td>99999</td>
</tr>
<tr>
<td>157</td>
</tr>
</tbody>
</table>
   (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:

<table>
<thead>
<tr>
<th>term</th>
</tr>
</thead>
<tbody>
<tr>
<td>20081</td>
</tr>
<tr>
<td>20089</td>
</tr>
</tbody>
</table>