Set Operations: Solutions

Schema

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

Questions

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

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

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

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

(c) \{1, 1, 1, 3, 7, 7, 8\} − \{1, 5, 7, 7, 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');
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:**

```sql
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. Find all terms when csc369 was not offered.

**Solution:**

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

**Output:**

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