

### CSE 414 section 3: Solutions

1). How many classes are being taught by at least one instructor?

```
SELECT COUNT(DISTINCT number) AS class_count
FROM Teaches;
```

```
-- General case: we'll solve using subqueries and grouping - first, we group the
-- Teaches table by department and number in a subquery, then
-- we count the number of groups in the top-level query.
```

```
-- Note that we don't care what the subquery tuples are, only how many
-- tuples/groups there are, so we return dummy tuples containing only the
-- constant 1.
```

```
SELECT COUNT(*) AS class_count
FROM (
  SELECT 1
  FROM Teaches
  GROUP BY dept, number
) x ;
```

2). Which instructors teach more than 1 class?

```
-- With grouping -- no subquery
SELECT i.username, i.fname, i.lname
FROM Instructor i, Teaches t
WHERE i.username = t.username
GROUP BY i.username, i.fname, i.lname
HAVING COUNT(*) > 1;
```

```
-- Without grouping -- uses subquery
-- We refer to this kind of subquery as a correlated subquery
-- i is unbound in context of subquery, but is correlated to outer query
-- For each instructor, we issue the subquery
```

```
SELECT i.username, i.fname, i.lname
FROM Instructor i
WHERE 1 < (
  SELECT COUNT(*)
  FROM Teaches t
  WHERE t.username = i.username
);
```

3). Which courses do neither Dr. Levy nor Dr. Wetherall teach?

-- Sounds like a universal quantifier will be needed (e.g. NOT IN, ONLY, ALL)!

-- wrong --- why?

```
SELECT c.dept, c.number, c.title
FROM Class c, Teaches t
WHERE c.dept = t.dept AND
      c.number = t.number AND
      t.username NOT IN ('levy', 'djw')
```

;

-- This query incorrectly returns CSE 451 and 461 (twice, in fact),

-- because there are tuples in the join where the uid is neither

-- levy or djw, but the class is 451 and 461 -- this comes about

-- from the fact that tom and zahorjan teach those classes.

-- Here's a corrected version that tests that the \*class number\*

-- is not in the list that Hank and David teach:

```
SELECT *
FROM Class c
WHERE c.dept = 'CSE' AND
      c.number NOT IN (
        SELECT c.number
        FROM Class c, Teaches t
        WHERE c.dept = t.dept AND
              c.number = t.number AND
              t.username IN ('levy', 'djw')
```

)

;

-- This (correctly) returns only CSE 378.