--To warm up for HW3, let's do some exercise on "Nested Subqueries":

--Example:

-- Same database as last week:

-- Class(dept, number, title)

-- Instructor(username, fname, lname, started_on)

-- Teaches(username, dept, number)

-- See section1's sql file for CREATE TABLE and sample data for this database.

Q1). How many classes are being taught by at least one instructor?

  - Case 1 - no subquery

SELECT COUNT(DISTINCT number) AS class_count
FROM Teaches;

  - Case 2 - use subquery

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

Q2). Which instructors teach more than 1 class?

  - Case 1 - 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

  - Case 2 - use subquery

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

Q3). Which courses does neither Dr. Hank Levy nor Dr. David Wetherall teach?

- Case 1 - no subquery (incorrect attempt)

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');

- Case 2 - use subquery

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.
### Instructor

<table>
<thead>
<tr>
<th>username</th>
<th>fname</th>
<th>lname</th>
<th>started_on</th>
</tr>
</thead>
<tbody>
<tr>
<td>zahorjan</td>
<td>John</td>
<td>Zahorjan</td>
<td>1985-01-01</td>
</tr>
<tr>
<td>djw</td>
<td>David</td>
<td>Wetherall</td>
<td>1999-07-01</td>
</tr>
<tr>
<td>tom</td>
<td>Tom</td>
<td>Anderson</td>
<td>1997-10-01</td>
</tr>
<tr>
<td>levy</td>
<td>Hank</td>
<td>Levy</td>
<td>1988-04-01</td>
</tr>
</tbody>
</table>

### Teaches

<table>
<thead>
<tr>
<th>username</th>
<th>dept</th>
<th>number</th>
</tr>
</thead>
<tbody>
<tr>
<td>zahorjan</td>
<td>cse</td>
<td>378</td>
</tr>
<tr>
<td>tom</td>
<td>cse</td>
<td>451</td>
</tr>
<tr>
<td>tom</td>
<td>cse</td>
<td>461</td>
</tr>
<tr>
<td>zahorjan</td>
<td>cse</td>
<td>451</td>
</tr>
<tr>
<td>zahorjan</td>
<td>cse</td>
<td>461</td>
</tr>
<tr>
<td>djw</td>
<td>cse</td>
<td>461</td>
</tr>
<tr>
<td>levy</td>
<td>cse</td>
<td>451</td>
</tr>
</tbody>
</table>