Advanced SQL
Forum: `https://forum-db.informatik.uni-tuebingen.de/c/ss20-asql`

Assignment 3

Relevant videos: up to #14
`https://tinyurl.com/AdvSQL-2020`
Submission: Tuesday, 19.05.2020, 10:00 AM

Please note important changes regarding the grading in Advanced SQL:
`https://tinyurl.com/ybv5mbwg`.

1. [10 Points] **WITH or without**

   We can extract subqueries into CTEs. That's obvious in the absence of correlation, but can be more tricky if the subquery is correlated and thus depends on its enclosing query. The following assignment explores just this. Consider the two following queries `1)` and `2)` containing subqueries:

```
CREATE TABLE t (
  x int NOT NULL,
  y int NOT NULL
);

CREATE TABLE p (
  val int NOT NULL
);

-- 1)
SELECT t.x AS x
FROM   t AS t
WHERE  t.x IN
  (SELECT p.val
   FROM   p
   WHERE  p.val > 5);
```

```
INSERT INTO t VALUES
  (2,1),(5,3),(6,4),(7,6),(9,9);

INSERT INTO p VALUES
  (4),(5),(7),(8),(9);

-- 2)
SELECT t.x AS x
FROM   t AS t
WHERE  t.x IN
  (SELECT p.val
   FROM   p
   WHERE  p.val > t.y);
```

   (a) For each of the two queries `1)` and `2)`, introduce a CTE `subquery` that represents the subquery of the original SQL queries. Rewrite queries `1)` and `2)` without subqueries such that they refer to the CTE `subquery` instead.

   (b) Is rewriting one query more straightforward than the other? Explain briefly.

2. [20 Points] **King and Knight**

Familiarize yourself with the *incomplete* SQL file `chess.sql`. It defines a chess board where only black and white king (♔,♚) and knight pieces (♘,♞) can be placed.
In chess, knights and kings move in a certain pattern[1]. You are tasked to complete the SQL file. Once completed, running `chess.sql` with its example will produce the following output, where we can see the possible moves for each piece we selected. Of course, this is only one of many possible arrangement of pieces.

```
   | A B C D E F G H
---+-----------------
 8 |   | | | |0|0|0|
 7 |   | | | |0|♚|0|
 6 |   | |0| |0|0|0|
 5 |   |♞| | | |0| |
 4 |   | | |♘| | | |
 3 |   |0| | | |0| |
 2 |   | |0| |0| | |
 1 |   | | |♔| | | |
(8 rows)
```

Example: The ♘ and ♚ are selected and their possible movements are shown (represented as `0`).

(a) Complete the CTE `board_and_pieces`. Replace the `YOUR QUERY HERE` with your solution.

(b) Complete the CTE `possible_movement`. Replace the `YOUR QUERY HERE` with your solution.

Note: In case you run into problems with the unicode chess piece characters in `chess.sql`, we also provided you with a file where the unicode chess piece characters ♔, ♚, ♘ and ♞ are replaced by `k`, `K`, `n` and `N` respectively.

[1] For details about chess, see `https://en.wikipedia.org/wiki/Chess`.