Database Systems, CSCI 4380-01
Homework # 1(b)
Due Thursday September 12, 2018 at 11:59:59 PM

Homework Statement. This homework is worth 1.5% of your total grade. If you choose to skip it, Midterm #1 will be worth 1.5% more. Remember, practice is extremely important to do well in this class. I recommend that not only you solve this homework, but also work on homeworks from past semesters. Link to those is provided in the Piazza resources page.

This part of the homework is for slightly harder relational algebra queries. It uses the same database as in part (a), so details of the data model can be found there.

Database Description. Suppose you are given the following database for AirBnB for a single city (shortened from the actual public Airbnb database):

```
hosts(host_id, host_name, host_url, host_since, host_location, host_about,
  host_response_time, host_acceptance_rate, host_is_superhost, host_identity_verified)

neighborhoods(neighbourhood_group,neighbourhood)

listings(listing_id,name,host_id,neighbourhood,latitude,longitude,
  room_type, price, minimum_nights,number_of_reviews, scores_rating, scores_accuracy,
  scores_cleanliness, scores_checkin, scores_communication,scores_location)

calendar(listing_id,date, available, price)

reviews(review_id, listing_id, date, reviewer_id, reviewer_name, comments)
```

Question 4. Write the following queries using relational algebra using any combination of operators (pay attention to the attributes required in the output!):

(a) Return id, name, latitude and longitude of listings that are available in two consecutive days in November 2019. Return their name and ID. (Note: you can compare two days as follows: `day1 = day2+1` to check that they are consecutive.)

(b) Return the name of neighborhood groups where the listings for `'Entire Home'` rooms (`room_type`) start from $400 despite some listings of this room type having scores lower than 4 (`scores_rating`).

In short, some listings of this type has scores lower than 4 and none of the listings have prices lower than $400.

(c) We are searching for potential fake reviewers in this final one.

Return the reviewer id of reviewers who have written a review for at least one listing in all of the `neighbourhood_groups` in the database.

Note that this is a challenging query, so we will for sure give partial credit even if your solution is not perfect! Do your best.

Question 5. You are given the following relations with associated set of functional dependencies. For each relation, find the keys. List all.

(a) $R1(A, B, C, D, E, F, G)$, $\mathcal{F} = \{A \to BC, A \to DEFG, F \to B\}$

(b) $R2(A, B, C, D, E, F, G)$, $\mathcal{F} = \{DE \to AF, AC \to G\}$

(c) $R3(A, B, C, D, E, F, G)$, $\mathcal{F} = \{AB \to CDEF, F \to A\}$

(d) $R4(A, B, C, D, E, F, G)$, $\mathcal{F} = \{AC \to DE, CDF \to G, BG \to A\}$

SUBMISSION INSTRUCTIONS. Submit a PDF document for this homework using Gradescope. No other format and no hand written homeworks please. No late submissions will be allowed.

If the gradescope for homework submissions is not immediately available, we will announce it on Piazza when it becomes available.