Assignment 4

Write the sql query for all the questions. Consult the manual to understand how to test your queries locally and run your queries on Gradescope. You only need to upload the file “relational_algebra_expressions.py” to Gradescope as a zip file. The schema and a test dataset for the sql queries in this assignment will be provided to you on the website (based on the solution to assignment 2.

1. Retrieve the names and genders of all people associated with ARC (i.e., members, employees, etc.)
   select pname, gender from people
2. List the names and departments of all ‘Faculty’ members who are also members of ARC.

```
Projection(NaturalJoin(
   NaturalJoin(Relation("Person"), Selection(Relation("non_student"),
Equals("member_type", "Faculty"))),
   Relation("university_affiliate")), ["name", "department"])
```

   select name, department from
   (select * from person natural join (select * from non_student where member_type = “faculty”) natural join university_affiliate)

3. Find the names of the people who were present in **either the ‘weight room’ or the ‘cardio room’** on 2023-04-01.

4. Find the names of the people who have attended all events.

5. List the events whose capacity have reached the maximum capacity of their associated space. **(Just project the event ids)**

```
Projection(
   Selection(NaturalJoin(Relation("events"), Relation("space")),
GreaterEquals("capacity", "max_capacity")),
   ["event_id"])
```

   select event_id from events natural join space where capacity > max_capacity

6. Find the names of students who have used all the equipment located in the cardio room.

```
expression6 = Projection(
   NaturalJoin(
       NaturalJoin(
           Division(
               Projection(
                   NaturalJoin(
                       NaturalJoin(
                           Relation('usage_reading'), Relation('equipment')
                       ),
                       Selection(
                           Relation('space'),
                           Equals('space_description', 'cardio room')
                       )
                   ),
                   ['card_id', 'equipment_id'],
               ),
               Projection(
                   NaturalJoin(
                       NaturalJoin(
                           Relation('usage_reading'), Relation('equipment')
                       ),
                       Selection(
                           Relation('space'),
                           Equals('space_description', 'cardio room')
                       )
                   ),
                   ['equipment_id'],
               )
           ),
           Relation('student')
       ), Relation('person')),
   ['name']
)
```

7. List the equipment ids and types for equipment that is currently in use. (1 for in use)

```
Projection(Selection(Relation("Equipment"), Equals("is_available", 1)),
                        ["equipment_id", "equipment_type"])
```

select equipment_id, equipment_type from Equipment where is_available = 1

8. Find names of all employees in ARC.

```
Projection(NaturalJoin(Relation('person'), Relation('employee')),
['name'])
```

select name from person natural join employee

9. Retrieve the names of all members who have attended an event in the yoga studio.

```
Projection(
   (NaturalJoin(NaturalJoin(Relation("member"),
                            NaturalJoin(Relation('attends'),

Selection(NaturalJoin(Relation('events'), Relation('space')),

Equals('space_description', 'yoga studio')))),
                Relation('person')))
```

events natural join space

10. Find all family members who have attended ‘Summer Splash Fest’.

```
Projection(
   NaturalJoin(NaturalJoin(NaturalJoin(Relation("person"), Relation("family")),
                           Relation('attends')),
               Selection(Relation("events"), Equals("events.description",
"Summer Splash Fest"))),
   ['name'])
```

select name from
person natural join family natural join attends natural join events e
where e.description = “Summer Splash Fest”

11. Calculate the average hourly rate paid to all employees who are of student type at ARC

12. Find the trainer(s) with the 2nd highest average hourly rate

13. Calculate the total duration spent by Mekhi Sporer in the weight room. *(count the number of days they have visited the weight room)*

14. Find the names of the member(s) who spent the most time in the cardio room in the month of May. *(count the number of days they have visited the cardio room)*

15. Find the name and the average occupancy of the space which has the lowest average occupancy per event. (you need to get the occupancy from the attends table.