Gurpreet deep Singh 100421135

CPSC 2221 - Database System
Lab 7 – RA and Datalog
Individual Lab
Total Marks: 25

Question 1. Given following relational schema, write expressions of **relational algebra** to answer the following queries.

Product(<u>model</u>, maker, type)

PC(<u>model</u>, speed, ram, hd, price)

Laptop(<u>model</u>, speed, ram, hd, screen, price)

Printer(<u>model</u>, color, type, price)

1. Find those manufacturers whose laptops have all ram sizes that manufacturer B's laptops have.

$RB \leftarrow \pi_{ram}(Laptop \bowtie Product\ \sigma_{maker='B'})$

$RM \leftarrow \pi_{ram,maker}(Laptop \bowtie Product)$

$Ans \leftarrow \pi_{maker}(RM \div RB)$

2. Find the manufacturers of PC's with at least two different speeds.

$Ans \leftarrow \pi_{maker.1}(\sigma_{maker1=maker2 \wedge speed1 \neq speed2}(P_1(T) \times P_2(T)))$

Question 2. *Consider a database consisting of the relations, where the primary key of each relation is underlined.*

sailors (<u>sid</u>, sname, rating, age)

boats (<u>bid</u>, bname, color)

reserved (<u>sid</u>, <u>bid</u>, date)

Write the following queries in Datalog.

1. Find the names of sailors who have reserved at least two different boats with the same color.

```
SameColorBoat(SID) :- reserved(SID, B1, -),
                      reserved(SID, B2, -), boats(B1, -, C)
                                            /boats(B2, -, C)
Ans(Sname) :- SameColorBoat(SID), sailors(SID, Sname
                                           , -, -)
```

2. Find the names of sailors who have reserved all red boats.

redBoat(BID) :- boats(BID, _, red)

sailorRed(SID, BID) :- reserved(SID, BID, _), redBoat(BID).

missingRed(SID, BID) :- redBoat(BID), not reserved(SID, BID, _)

final(Sname) :- sailors(SID, Sname, _, _)
, not missingRed(SID, _)

3. Find the name and rating of the oldest sailor(s).

Younger(SID1) :- sailors(SID1, _, _, Age1)
, sailors(SID2, _, _, Age2)
, Age1 < Age2

oldest(SID) :- sailors(SID, _, _, _)
, not Younger(SID)

Final(Sname, rating) : oldest(SID)
, sailors(SID, Sname, rating, _)