CS348 - Homework 2
FALL 2018

Due:
(There will be a 10% penalty for each late calendar day. After five calendar days, the homework will not be accepted.)

(100 Points)- Relational Algebra, Relational Calculus, and QBE

1) (30) Consider the following relational schema:

Suppliers (***sid***, sname, address)
Parts (***pid***, pname, color)
Catalog (***sid, pid,*** cost)

Now, write the Relational Algebra (RA), Tuple Relational Calculus (TRC), and Domain Relational Calculus (DRC) to answer the following queries. Note that some of these queries might not be expressible in Relational Algebra or Relational Calculus. For such queries, informally explain why they cannot be expressed:

a) Find the *names* of the suppliers who supply some red or green part.
RA:

$$\pi_{sid}(\pi_{pid}(\sigma_{color='red' \vee color='green'} Parts) \bowtie catalog)$$

TRC:

$$\{T \mid \exists T1 \in Catalog(\exists X \in Parts((X.color = `red' \vee X.color = `green') \wedge X.pid = T1.pid) \wedge T.sid = T1.sid)\}$$

DRC:

$$\{\langle X \rangle \mid \langle X, Y, Z \rangle \in Catalog \wedge \exists A, B, C(\langle A, B, C \rangle \in Parts \wedge (C =' red' \vee C =' green') \wedge A = Y)\}$$

b) Find the *sids* of suppliers who supply every part.
RA:

$$(\pi_{sid,pid} Catalog)/(\pi_{pid} Parts)$$

TRC:

$$\{T \mid \exists T1 \in Catalog(\forall X \in Parts(\exists T2 \in Catalog (T2.pid = X.pid \wedge T2.sid = T1.sid)) \wedge T.sid = T1.sid)\}$$

DRC:

$$\{\langle X \rangle \mid \langle X, Y, Z \rangle \in Catalog \wedge \forall \langle A, B, C \rangle \in Parts (\exists \langle P, Q, R \rangle \in Catalog(Q = A \wedge P = X))\}$$