## Exercise 1: Convert the following statements to relation Algebra

- Find the names of suppliers who supply some red part.
  **Answer :** $\pi_{Sname}(\pi_{sid}((\pi_{pid}\sigma_{color = red}Parts) \bowtie Catalog) \bowtie Suppliers)$

- Find the sids of suppliers who supply some red or green part.
  **Answer :** $\pi_{sid}(\pi_{pid}(\sigma_{color = red \vee color = green}Parts) \bowtie Catalog)$

- Find the sids of suppliers who supply some red part or are at 221 Packer Street.
  **Answer :** $\rho(R1, \pi_{sid}((\pi_{pid}\sigma_{color = red}Parts) \bowtie Catalog))$
  $\rho(R2, \pi_{sid}\sigma_{address = 221ParckerStreet}Suppliers)$
  $R1 \cup R2$

- Find the sids of suppliers who supply some red part and some green part.
  **Answer :** $\rho(R1, \pi_{sid}((\pi_{pid}\sigma_{color = red}Parts) \bowtie Catalog))$
  $\rho(R2, \pi_{sid}((\pi_{pid}\sigma_{color = green}Parts) \bowtie Catalog))$
  $R1 \cap R2$

- Find the sids of suppliers who supply every part.
  **Answer :** $(\pi_{sid, pid}Catalog)/(\pi_{pid}Parts)$

- Find the sids of suppliers who supply every red part.
  **Answer :** $(\pi_{sid, pid}Catalog)/(\pi_{pid}\sigma_{color = red}Parts)$

- Find the sids of suppliers who supply every red or green part.
  **Answer :** $(\pi_{sid, pid}Catalog)/(\pi_{pid}\sigma_{color = red \vee color = green}Parts)$

- Find the sids of suppliers who supply every red part or supply every green part.
  **Answer :** $\rho(R1, ((\pi_{sid, pid}Catalog)/(\pi_{pid}\sigma_{color = red}Parts))$
  $\rho(R2, ((\pi_{sid, pid}Catalog)/(\pi_{pid}\sigma_{color = green}Parts))$
  $R1 \cup R2$

- Find pairs of sids such that the supplier with the first sid charges more for some part than the supplier with the second sid.
  **Answer :** $\rho(R1, Catalog)$
  $\rho(R2, Catalog)$
  $\pi_{R1.sid, R2.sid}(\sigma_{R1.pid = R2.pid \wedge R1.sid! = R2.sid \wedge R1.cost > R2.cost}(R1 \times R2))$

- Find the pids of parts supplied by at least two different suppliers.
  **Answer :** $\rho(R1, Catalog)$
  $\rho(R2, Catalog)$
  $\pi_{R1.sid}\sigma_{R1.pid = R2.pid \wedge R1.sid! = R2.sid}(R1 \times R2)$

**Exercise 2: For the previous schema, state what the following queries compute:**

**Answers :**

1. Find the names of the suppliers who supply red parts with cost less than 100

2. Find the names of the suppliers who supply red parts with cost less than 100 and green parts with cost less than 100

3. Find the sid of suppliers who supply red parts with cost less than 100 and green parts with cost less than 100

4. Find the sid and names of suppliers that supply red parts with cost less than 100 and green parts with cost less than 100 then find the names