Question 6

a.) SELECT R_1.Sid, R_2.Sid
From Catalog R_1, Catalog R_2
where (R_1.pid = R_2.pid AND R_1.sid $\neq$ R_2.sid AND
R_1.cost > R_2.cost)
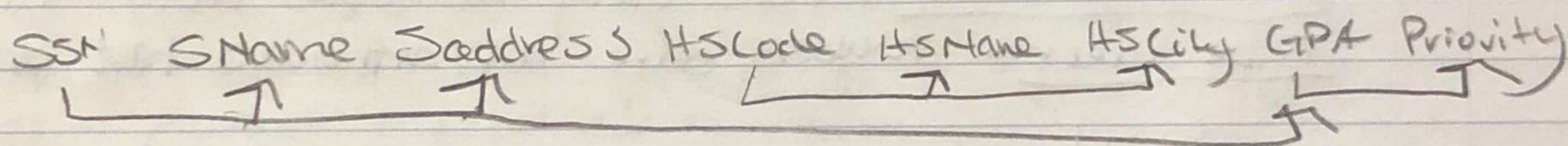
b.) SELECT sid
From Supplier S
WHERE EXIST (SELECT *
FROM Parts p, Catalog c
WHERE (S.SID = c.SID AND p.pid = c.PID
AND p.color = "Red" OR s.address = Ruston City

Question 8

8.1

Student (SSN, SName, Saddress, HSCode, HS Name, HSCity,
        GPA, Priority)

FD: {HSCode → (HSName, HScity)), GPA ⇒ Priority,
SSN ⇒ SName, Saddress, GPA}

SSN   SName   Saddress   HSCode   HSName   HSCity   GPA   Priority

- SSN ⇒ SName, Saddress, GPA   ✓

  SSN^+: SSN, SName, Saddress, GPA

  partial dependency

- GPA ⇒ priority

  GPA^+: GPA, priority

  non-prime

- HScode ⇒ HS Name, HScity

  partial

  SSN, HScode$^+$: SSN, SName, Saddress, GPA, Priority, HScode, HsName, HScity

  └ primary key

Student (SSN, SName, Saddress, HScode, HsName, HSCity, GPA, Priority)
using GPA ⇒ Priority
   └ S_1 (GPA, Priority)
      S_2 (GPA, SSN, SName, Saddress, HSCode, HsName, HScity)
using
HScode   └ S_{21} (HScode, HSName, HSCity)
⇒ ... S_{22} (HScode, SSN, SName, Saddress, GPA, Priority)
using S_{221} └ (SSN, SName, Saddress, GPA)
SSN⇒ ... S_{222} (SSN, HScode)

8.2| Syntactic Checks - making sure syntax of operators is okay.

Entity checks - Does every relation name refer to valid relation

View expansion: If relation refers to view, replace relation node with parse tree of view.

Attribute Checks: IS every attribute name valid?

Type checks: makes sure all attributes have proper type.

Question 9.11

(i) $R_1 \cup R_2 = R$

(ii) $R_1 \cap R_2 \neq \emptyset$ [Null]

(iii) $R_1 \cap R_2 \Rightarrow R_1$ or $R_1 \cap R_2 \Rightarrow R_2$

1.) (i) $R_1 \cup R_2 = R$ — holds True. ✓

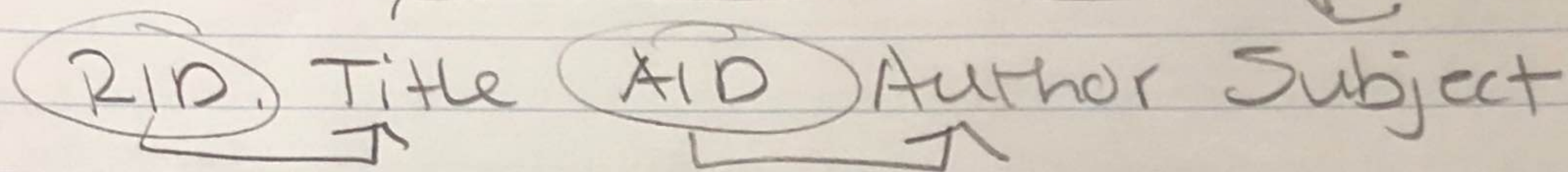(ii) $R_1 \cap R_2 \neq \emptyset$ — holds True. ✓

(iii) $R_1 \cap R_2 \Rightarrow R_1$ or $R_1 \cap R_2 \Rightarrow R_2$ — holds True. ✓

2.) (i) $R_1 \cup R_2 = R$ holds true. ✓

(ii) $R_1 \cap R_2 \neq \emptyset$ holds true. ✓

(iii) $R_1 \cap R_2 \Rightarrow R_1$ or $R_1 \cap R_2 \Rightarrow$ False ✗ They need to share unique attribute.

Q 9.2 | REPORT (RID, Title, AID, Author, Subject)

FD: { RID → Title, Title → Subject, AID → Author)

RID, Title, AID, Author, Subject

RID, AID$^+$: RID, AID, Title, Author, Subject (primary key)

RID → Title = partial

Title → Subject = Transitive

AID → Author = partial

R(RID, Title, AID, Author, Subject)

LR(RID, AID, Author)

R_2(RID, Title, Subject)

R_{21}(RID, Title)

R_{22}(Title, Subject)