Consider the following relation R(A, B, C, D, E) and functional dependencies F that hold over this relation.

Consider the following relation R (ApplicationID, BankID, SSN, type, income, name) for loan bank systems. Using the following assumptions

Each customer can have one SSN and only one name associated with the SSN and have one income

A customer can apply for multiple loans. However, applicationID at a given bankID, is for one customer and one given type.

One applicationID is associated with one customer at a given bankID applying for a given types loan

The functional dependencies deduced for these assumptions are as follow:

SSN → income , name

ApplicationID, BankID → SSN, type, name

SSN , BankID, type→ ApplicationID, income

1. C -> E F
2. A B -> C D F or A B -> C D cuz of 1
3. C B D -> A E or C B D -> A cuz of 1

1- Find the candidate key (s)

**{ApplicationID, BankID} and {SSN, BankID, type}**

2- Find the canonical cover

**C -> E F SSN -> income, name**

**A B -> C D ApplicationID, BankID -> SSN, type**

**C B D -> A SSN, BankID, type -> ApplicationID**

3- What normal is R

**First normal form**

4- Decompose R into 3NF schema

**R(C, E, F) {C -> E F} and R(A, B, C, D) {A B -> C D, C B D -> A}**

5- Decompose R into BCNF schema

**Same as above -**  **R(C, E, F) and R(A, B, C, D)**

Problem 2 For each of the following schedules determine which properties this schedule has. E.g., a schedule may be recoverable and cascade-less (strict). Consider the following notation for operations of transactions:

w1(A) transaction 1 wrote item A

r1(A) transaction 1 read item A

c1 transaction 1 commits

a1 transaction 1 aborts //not used at all… hmmm

S1 = r2(C), w2(A), w1(A), w2(B), c2, r3(B), c1, w3(B), c3

S2 = r1(C), w3(C), r2© r2(A), r1(B), w2(A), r2(B),r3(A), w1(B), c1, w3(A), c3, w2(B), c2

S3= r1(C), r1(B), r2(A), w2(A), w1(B), r2(C), w2(C), c1, w2(B), c2 S2

S4= r3(A), r1(B), w2(B), r1(C), w1(B),c1, w2(A), c3, **w1(A)** c2

**S1 is recoverable, cascade-less, conflict and view serializable**

**S2 is not recoverable and not cascade-less, not conflict and not view serializable**

**S3 is recoverable, cascade-less, conflict and view serializable**

**S4 is recoverable and cascade less. And also conflict and view serializable hmmm**