

**Question 3:**

a)

$S \rightarrow N$  ( $k_1 = S$ )

$S \rightarrow A$  ( $k_1 = S$ )

$C \rightarrow N$  ( $k_2 = C$ )

$k_1$  and  $k_2$  can both derive  $N$  therefore 1st NF

b)

$R \rightarrow N$ ,  $R \rightarrow E$ ,  $O \rightarrow C$ ,  $O \rightarrow R$

No non trivial join dependencies are valid in this schema therefore 5NF

c)

There are no functional dependencies

d)

$CS \rightarrow L$

$CS \rightarrow D$

$L \rightarrow C$

$CS \rightarrow C$  (Transitive)

BCNF as  $CS$  is a superkey, and all attributes it derives are prime