Assignment #4

COMP 440 - Spring 2020

Deadline: Thursday, 4/23 by 2:00 PM

Problem 1) 20 points

Given the relational schema *R(A, B, C, D, E, F, H)* with the following functional dependencies. Determine which of the following dependencies are implied by the inference axioms (Armstrong). State the appropriate axioms if the dependency is implied.

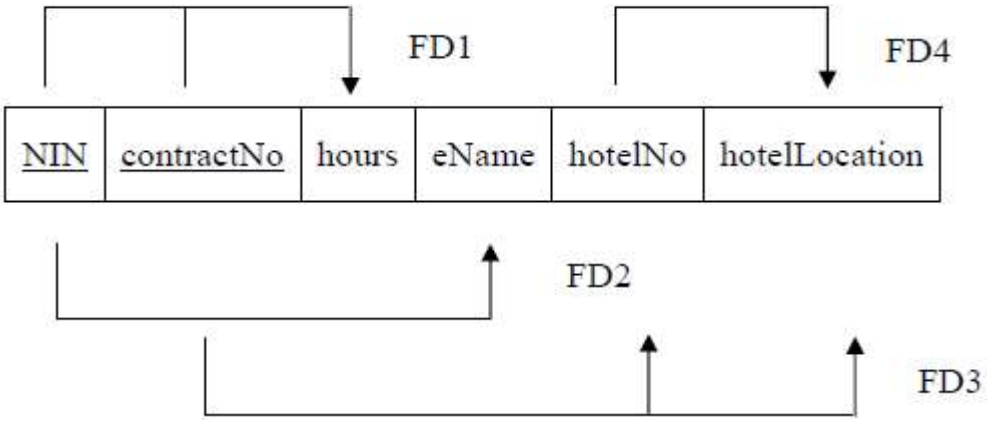
$$A \rightarrow D,\ AE \rightarrow H,\ DF \rightarrow BC,\ E \rightarrow C,\ H \rightarrow E$$

1. $A \rightarrow AD$
2. $A \rightarrow DH$
3. $AED \rightarrow C$
4. $DH \rightarrow C$
5. $ADF \rightarrow E$

Problem 2) – 35 points

Describe and illustrate the process of normalizing (step by step) the table shown below to BCNF. State any assumptions you make about the data shown in this table. Indicate the Primary Keys (PK) as well as the Foreign Keys (FK) for each new relations.

NIN	contractNo	hoursPerWeek	eName	hotelNo	hotelLocation
113567WD	C1024	16	John Smith	H25	Edinburgh
234111XA	C1024	24	Diane Hocine	H25	Edinburgh
712670YD	C1025	28	Sarah White	H4	Glasgow
113567WD	C1025	16	John Smith	H4	Glasgow

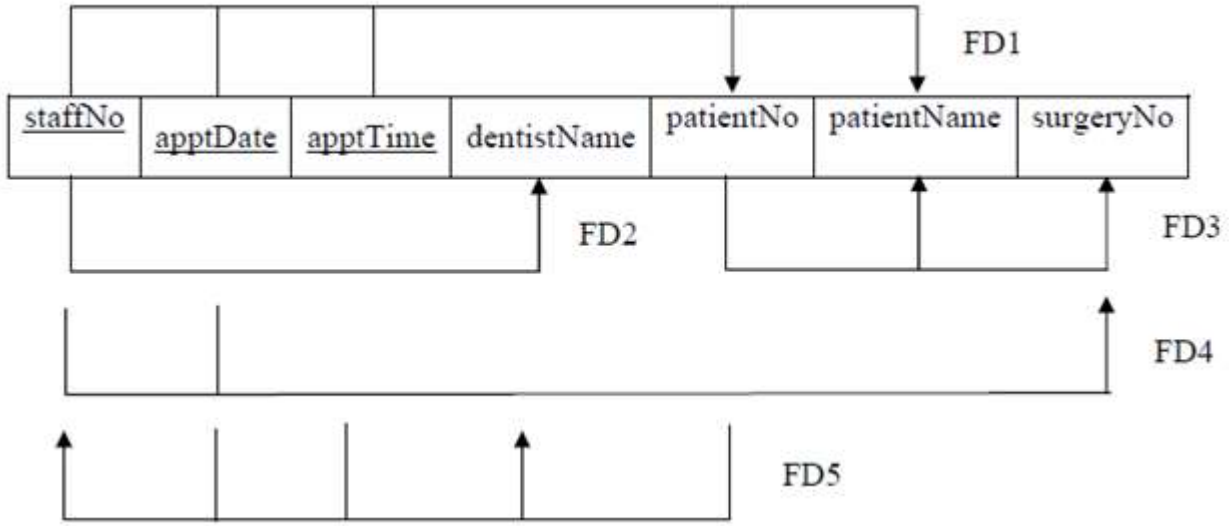


FD1: NIN, contarctNo → hours
FD2: NIN → eName
FD3: contarctNo → hotelNo, hotelLocation
FD4: hotelNo → hotelLocation

Problem 3) – 45 points

Describe and illustrate the process of normalizing (step by step) the table shown below to BCNF. State any assumptions you make about the data shown in this table. Indicate the Primary Keys (PK) as well as the Foreign Keys (FK) for each new relations.

staffNo	dentistName	patientNo	patientName	appointment		surgeryNo
				date	time	
S1011	Tony Smith	P100	Gillian White	12-Aug-03	10.00	S10
S1011	Tony Smith	P105	Jill Bell	13-Aug-03	12.00	S15
S1024	Helen Pearson	P108	Ian MacKay	12-Sept-03	10.00	S10
S1024	Helen Pearson	P108	Ian MacKay	14-Sept-03	10.00	S10
S1032	Robin Plevin	P105	Jill Bell	14-Oct-03	16.30	S15
S1032	Robin Plevin	P110	John Walker	15-Oct-03	18.00	S13



FD1: staffNo, appDate, appTime → patientNo, patientName
FD2: staffNo → dentistName
FD3: patientNo → patientName, surgeryNo
FD4: staffNo, appDate → surgeryNo
FD5: patientNo, appDate, appTime → staffNo, dentistName