

## Assignment 4

2. Consider the universal table  $T = \{A, B, C, D, E, F, G, H, I, J\}$  with the following set of functional dependencies:

$\{A, B\} \rightarrow \{C\}$

$\{B, D\} \rightarrow \{E, F\}$

$\{A, D\} \rightarrow \{G, H\}$

$\{A\} \rightarrow \{I\}$

$\{H\} \rightarrow \{J\}$

What is the primary key for T?

A, B, D

Decompose T into 2NF tables.

T<sub>1</sub>: {A, B, C}

primary key (A, B)

T<sub>2</sub>: {B, D, E, F}

primary key (B, D)

T<sub>3</sub>: {A, D, G, H, J}

primary key (A, D)

T<sub>4</sub>: {A, I}

primary key (A)

Decompose T into 3NF tables.

T<sub>1</sub>: {A, B, C}

primary key (A, B)

T<sub>2</sub>: {B, D, E, F}

primary key (B, D)

T<sub>3</sub>: {A, D, G, H}

primary key (A, D)

T<sub>4</sub>: {A, I}

primary key (A)

T<sub>5</sub>: {H, J}

primary key (H)

3. Consider the following table:

**CAR\_SALE(Car#, DateSold, Salesperson#, CommissionPercent, DiscountAmt)**

Assume that a car may be sold by multiple salespersons,

and hence {Car#, Salesperson#} is the primary key.

Additional functional dependencies are

$\{DateSold\} \rightarrow \{DiscountAmt\}$

$\{Salesperson\# \} \rightarrow \{CommissionPercent\}$

a) Based on the primary key, is this table in 1NF, 2NF, or 3NF? Why?

1NF. since it has no group attribute, but has partial dependence.

**b) How would you successively normalize it completely?**

T <sub>1</sub> : {Car#, Salesperson#, Datesold}	primary key (Car#, Salesperson#)
T <sub>2</sub> : {Datesold, DiscountAmt}	primary key (DateSold)
T <sub>3</sub> : {Salesperson#, CommissionPercent}	primary key (Salesperson#)

**4. Consider the following table for published books:**

**BOOK(BookTitle, AuthorName, BookType, ListPrice, AuthorAffil, Publisher)**

**AuthorAffil refers to the affiliation of author. Suppose the following functional dependencies exist:**

**{BookTitle} → {Publisher, BookType}**

**{BookType} → {ListPrice}**

**{AuthorName} → {AuthorAffil}**

**a) What normal form is the table in? Explain your answer.**

2NF. since it has no partial dependence, however has transitive dependence.

**b) Apply normalization until you cannot decompose the tables further. State the reasons behind each decomposition.**

T <sub>1</sub> : {BookTitle, Publisher, BookType}	primary key (BookTitle)
T <sub>2</sub> : {BookType, ListPrice}	primary key (BookType)
T <sub>3</sub> : {AuthorName, AuthorAffil}	primary key (AuthorName)