14.31– Consider the universal relation R = {A, B, C, D, E, F, G, H, I} and the set of functional dependencies

F = { {A, B} -> {C}, {A} -> {D, E}, {B} -> {F}, {F} ->{G, H}, {D} -> {I, J}}.

What is the key for R? Decompose R into 2NF, then 3NF relations.

14.32— Repeat for the following different set of functional dependencies

G = { {A, B} -> {C}, {B, D} -> {E, F}, {A, D} -> {G, H}, {A} -> {I}, {H} -> {J} }.

14.37— Consider a relation R(A,B,C,D,E) with the following dependencies:

AB -> C

CD -> E

DE -> B

Is AB a candidate key of this relation? If not, is ABD? Explain your answer.

15.30. Consider the following relation:

CAR_SALE(Car#, Date_sold, Salesperson#, Commission%, Discount_amt)

Assume that a car may be sold by multiple salespeople, and hence {Car#, Salesperson#} is the primary key. Additional dependencies are

Date_sold → Discount_amt and

Salesperson# → Commission%

Based on the given primary key, is this relation in 1NF, 2NF, or 3NF? Explain your answer? How would you successively normalize it completely?

15.31. Consider the following relation for published books:

BOOK (Book_title, Author_name, Book_type, List_price, Author_affil, Publisher)

Author_affil refers to the affiliation of author. Suppose the following dependencies exist:

Book_title → Publisher, Book_type

Book_type → List_price

Author_name → Author_affil

a. What normal form is the relation in? Explain your answer.

b. Apply normalization until you cannot decompose the relations further.

For each of the following relation schemas and sets of FD's:

1) ***R is (A, B, C, D) with FD's A -> B, B -> C, C -> D, D -> A.***
2) ***R is (A, B, C, D) with FD's B -> C and B -> D.***

Identify candidate keys for R

a. ***Indicate BCNF violations and decompose if necessary.***
b. ***Indicate 3NF violations and decompose if necessary.***