Homework 3

Name_____

Problem 1 (10 Points): Given a relation with five attributes R(A,B,C,D,E) and functional dependencies,

AB→C, BD→E, C→D

which of the following does not functionally determine E.

A. BCD
B. BE
C. ABC
D. AC

Problem 2(25 Points): Consider a relation R(A,B,C) with functional dependencies A→B, B→C. Suppose R already has a tuple (1,1,2), can we insert new tuples (1,1,3), (0,3,3)? Why?

(1,1,3) can not be inserted because it's A is the same as the one already there and its B is all the same as the existing one.

(0,3,3) can be inserted because is A is different then the existing one and also its B.

Problem 3 (30 points): Decompose the relation R(A,B,C,D, E) using BCNF. R has the following functional dependencies:

A→B, C→D, AC→E

A -> B violates BCNF because A is not superkey

(a,b) and (a,c,d,e)

C -> D violates BCNF because is not superkey

(c, d) and (a, c, e)

AC -> E is good

Problem4 (35 Points): Consider a relation R(A,B,C,D, E) with functional dependencies BDE → A, AC → E, B → C, DE → A. Does any of these FD violate BCNF? why?

Merged cover

AC -> E

B -> c

DE -> A

AC -> E violates BCNF because AC is not superkey

(a, c, e) and (a, b, c, d)

B -> C violates BCNF because B is not superkey

(b, c) and (a, b, d)

If we change R's functional dependencies to BCD → E, BDE → C, BE → D, BE → A, does any of these FD violate BCNF? why?

Merged cover

BCD -> E

BE -> CDA

Already in BCNF form