**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.

1. BCD
2. BE
3. ABC
4. 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*