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CSCD 327 Lab 7 (16 points)

1. (6 points) A given relation R={A, B, C, D, E} is decomposed into three relations: R1={A, B, C}, R2={B, C, D}, and R3={A, C, E}
    a. Based on the given set of FDs F={B→E, CE→A}, is the above decomposition a lossless-join decomposition?

R1 and R2 and R3 = C
(C)* = (C, A, B, D, E)

No, because B -> E is not a key in R1, R2, or R3.

    b. Based on the given set of FDs F={AC→E, BC→D }, is the above decomposition a lossless-join decomposition?

With the information above, this is a lossless-join composition since both AC -> E and BC -> D are both keys from R3 and R1 respectively.

2. (10 points) A given relation R={A, B, C, D, E}, and a given set of FDs F={AB→C, DE→C, B→D}.
    a. Is R in BCNF? If not, do the decomposition accordingly.

R1 = {A, B, C}
R2 = {D, E, C}
R3 = {B, D}

R1 and R2 and R3 = {}, therefore R3 = {C, D} so R1 and R2 and R3 = {C}
(C)* = {C, A, B, D, E}

    b. Is your decomposition a lossless-join decomposition? Why?

Yes, since all FD's are keys in all R1, R2, and R3

    c. Is your decomposition a dependency-preserving decomposition? Why?

AB -> C not preserved
DE -> C not preserved
C -> D preserved

    d. List all the candidate keys of relation R.

{C}

    e. Is R in the 3rdNF? Why?

(C)* = (C)
(AC)* = A, C, B, D, E
(BC)* = B, C, A, D, E
(DC)* = D, C, A, B, E
(EC)* = E, C, A, B, D

Yes, because A, B, D, E are prime attributes.