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Section number: 11207

Assignment number: 6

Date due: 2/28/2020

1) Consider the relation R(A,B,C,D) having the Functional Dependencies: {BCD → A, A → D}. Prove your answer to these questions.

    a. Possible minimal keys for R:
    {BCD}, {BCA}
    There is no way to get BC other than starting with them so it must be in both keys. If you add D, you can use BCD → A to get A.
    Back to the base of BC, if you add A, you can use A → D to get D.

    b. Currently, what is the normal form of R?
    Not 3NF because A → D is not a superkey. It is 2NF.

    c. Preserving dependencies, show how to transform R into BCNF if it is not already in BCNF.
    It is not BCNF because A → D is not a super key.

R = {A,B,C,D}	Start
R = {(A,B,C), (A,D)}	A → D

    R1 = ABC, R2 = AD

2) Consider the relation S (A,B,C,D,E) having the Functional Dependencies: {AB → C,DE → C, B → D}. State any BCNF violations. Then, decompose, as necessary, the relation into a collection of relations that are in BCNF.

Minimal key: {ABE}

AB = {A,B,C,D} → violation, not superkey
DE = {C,D,E} → violation, not superkey
B = { B,D} → violation, not superkey

S = R {A,B,C,D,E}	Start
S = R {(A,B,D,E), (A,B,C)}	AB → C
S = R {(A,B,D,E), (A,B,C), (D,E,C)}	DE → C
S = R {(A,B,E), (A,B,C), (D,E,C), (B,D)}	B → D

R1 = ABE, R2 = ABC, R3 = DEC, R4 = BD

3) Consider the relation T (A,B,C,D,E,F)having the Functional Dependencies: {E → CF, CA → B, BD → E}. Prove your answers to these questions.

   a. What are all the possible <minimal> keys for T?
      Minimal keys: {A,D,B}, {A,D,C}, {A,D,E}

   b. Is T in BCNF?
      No none of the FDs are superkeys

   c. Is T in 3NF?
      No, for the same reason it is not BCNF, none of the FDs are superkeys.