COMSATS University, Islamabad (CUI)

Department of Computer Science

Quiz – 3 [CLO-C3]

Solution

Course: CSC371 – Database Systems | **Time Allowed (min) / Total Marks: 20/10**
Date: December 14, 2021 | **Class / Semester: BCS-IV / FALL 2021**
Reg. no: _____

1- For a relation R1(A,C,B,D,E) with dependencies AB → C, C → D, BD → E, which of the following does not functionally determine E?

a) BC
b) CD is correct
c) BE
d) BCD

How: Find closure of CD. It does not include E attribute.

2- Consider relation R(A,B,C,D,E,F,G) with functional dependencies: AB → C, CD → E, EF → G, FG → E, DE → C, and BC → A. Which of the following is a key?

a) BDE
b) BDEG
c) ADFG
d) BCDF is correct

How: Find closure of BCDF. It includes all the attributes of R.

3- Let relation R(A,B,C,D,E,F,G,H) satisfy the following functional dependencies: A→ B, CH → A, B → E, BD → C, EG → H, DE→ F. Which of the following FDs is also guaranteed to be satisfied by R?

a) CGH → BF
b) ADE → CH
c) ADG → CF is correct
d) BCD → FH

How: Find closure of ADG. It includes attributes C and F.

4- Suppose relation R(A,B,C) currently has only the tuple (0,0,0), and this relation has to satisfy the functional dependencies A → B and B → C. Which of the following tuples may be inserted into R legally?

a) (0,0,2)
b) (0,0,1)
c) (1,2,0) is correct
d) (0,2,1)

How: Insertion of (1,2,0) does not lead to the violation of the definition of functional dependency for both the given FDs.

5- Assume that we have the following four tuples in a relation R(A,B,C,D): (1,2,3,5), (4,2,3,5), (5,3,4,3), (2,3,4,5). Which of the following FDs holds on R?

a) B → A
b) CD → B is correct

c) C → D

d) BC → D

How: CD → B does not lead to the violation the definition of functional dependency for the given instance of R

6- Let R(A,B,C,D,E) be a relation in Boyce-Codd Normal Form (BCNF). Suppose CDE is the only key for R. Which of the following functional dependencies is guaranteed to hold for R?

a) BCD → E

b) ADE → B

c) ABC → E

d) CDE → A is correct

How: Since CDE is the key, so it ought to determine all the attributes of R including A.

7- Consider a relation R(A,B,C,D) with following set of FDs: A -> B, C -> D, AD -> C, BC -> A. Suppose we decompose R into BCNF using decomposition algorithm. Which of the following relations could not be in the result of decomposition?

a) R1(A,B)

b) R2(C,D)

c) R3(A,C)

d) R4(A,B,C) is correct

How: Among the given FDs, only A -> B, C -> D violate the BCNF condition. If we decompose based on A -> B, we will get (A, B) and (A, C, D). This makes option a) incorrect. If we further decompose (A, C, D) based on C -> D, we will get (C, D) and (C, A). This makes option b) and c) incorrect

8- Assume that the following set of FDs A -> B, B ->C, C ->A, D ->E, E->D, are holding on a relation R(A,B,C,D,E). Which of the following set of tuples satisfy this set of FDs?

a) (a1,b1,c1,d1,e2), (a1,b1,c1,d2,e2)

b) (a1,b1,c1,d1,e1), (a1,b1,c1,d2,e1)

c) (a1,b1,c1,d1,e1), (a1,b2,c1,d2,e2)

d) None of the above is correct

How: (a1,b1,c1,d1,e2), (a1,b1,c1,d2,e2) and (a1,b1,c1,d1,e1), (a1,b1,c1,d2,e1) violate E->D. (a1,b1,c1,d1,e1), (a1,b2,c1,d2,e2) violates A -> B.

9- Consider a relation R(A,B,C,D). For which of the following sets of FDs is R in Boyce-Codd Normal Form (BCNF)?

a) AC → D, D → A, D → C, B → D

b) BC → A, AD → C, CD → B, BD → C

c) C → D, CD → A, AB → C, A → B is correct

d) C → B, BC → A, A → C, BD → A

How: Left hand side of each of the FDs determines all of the attributes of R and consequently forms a key which can be verified by taking their closures.

10- For a relation R(A,C,B,D,E) with dependencies B -> D, A -> C, which of the following is the candidate key?

a) {ADE}

b) {ACE}

c) {ABE} is correct

d) {ABC}

How: Clouse of {ABE} includes all the attributes of R.