

Database Design Practice Test

1. (4 points) Compute the canonical cover for the following:

$R = (A, B, C, D, E)$

$F = (A D \rightarrow C,$
 $C \rightarrow E,$
 $B \rightarrow A,$
 $A \rightarrow C)$

2. (1 point) Given the relation $R = (A, B, C, D, E)$ and the functional dependencies: $F = C \rightarrow BD, AD \rightarrow E, C \rightarrow A$

Compute C^+ (i.e. Show your work):

3. (4 points) Give a BCNF, lossless join, dependency preserving decomposition of problem 2 (show your work).

4. (4 points) Given the following relation:

$R = (\text{student_id}, \text{student_name}, \text{student_phone}, \text{dept_name}, \text{dept_phone}, \text{dept_chair_name}, \text{skill_id}, \text{skill_date}, \text{skill_level}, \text{skill_name})$

and the functional dependencies:

$F = \text{student_id} \rightarrow \text{student_name} \text{ student_phone dept_name}$
 $\text{dept_name} \rightarrow \text{dept_phone dept_chair_name}$
 $\text{student_id skill_id} \rightarrow \text{skill_date skill_level}$

Give a 3NF decomposition of the relation.

5. (3 points) What is canonical cover for problem 2?

6. (2 points) Find the candidate keys for the following:

$R = (A, B, C, D)$

$F = CD \rightarrow AB$

$B \rightarrow D$

7. (2 points) Give a 3NF decomposition of the following:

$R = (\text{studentID}, \text{class_no}, \text{class_room}, \text{text})$

$F = \text{class_no} \rightarrow \text{class_room text}$

8. (2 points) With the tables:

(A, C)

(B, C)

and $F = C \rightarrow B$

Show that these tables are a lossless join decomposition.

9. (1 point) Give a candidate key for problem 1.

10. (2 points) Give a BCNF decomposition of the following:

$R = (S, A, M)$

$F = A \rightarrow M$

11. (6 points) Give the best dependency preserving, lossless decomposition (3NF or BCNF) possible for the following
(Note: show your work and indicate primary keys):

Attributes:

$I, N, D, S, Y, B, E, W, X, C, T$

Functional Dependencies:

$I \rightarrow N$

$S Y \rightarrow B E$

$D \rightarrow W S Y$

$W \rightarrow X$

$I C D \rightarrow T$

Multiple Choice (1 point each)

12. Given a relation $R = (A, B, C, D, E)$ and a set of functional dependencies, what does $(BC)^+$ mean?
- a. Closure of functional dependencies
 - b. Canonical cover of functional dependencies
 - c. closure of an attribute set
 - d. Lossy join functional dependencies