

1. **(14AU Final Q10)**

A lossless decomposition is one in which all of the data in the original table is recovered exactly, if the decomposed tables are combined with natural joins.

Every BCNF decomposition is lossless.

TRUE or FALSE

2. **(17WI Final Q1)**

BCNF is a lossless decomposition and it does not preserve all functional dependencies.

TRUE or FALSE

3. **(14WI Final Q2)**

Consider Relation $R(ABCD)$. and functional dependencies (FDs): $BD \rightarrow AC$; $AB \rightarrow D$; $AC \rightarrow B$.

This relation is in Boyce-Codd Normal Form (BCNF).

TRUE or FALSE.

Identify a key (not a superkey)

4. **(14 WI Final Q2)**

Consider Relation $R(ABCDE)$. and functional dependencies (FDs): $A \rightarrow C$; $B \rightarrow AE$; $E \rightarrow D$.

This relation is in Boyce-Codd Normal Form (BCNF).

TRUE or FALSE

Identify a key (not a superkey)

5. **(15AU Final Q2c)**

Consider the following relational schema and set of functional dependencies.

$R(A,B,C,D,E,F,G)$ with functional dependencies: $E \rightarrow C$, $G \rightarrow AD$, $B \rightarrow E$, $C \rightarrow BF$

Give one example of non-trivial functional dependency implied by the ones above:

Compute E^+ , the closure of E .

(17WI Final Q4)

Given $R(A, B, C, D, E)$, and functional dependencies: $A \rightarrow C$, $BD \rightarrow A$, $D \rightarrow E$

a) Decompose R into BCNF. In each step, explain which functional dependency you used to decompose and explain why further decomposition is needed. Your answer should consist of a list of table names and attributes. Make sure you indicate the keys for each relation.

b) Convert the E/R diagram below to relations in BCNF form. Assume no values are NULL, and the arrow between *OfferedBy* and *Depts* is a round one. Include all keys and foreign keys. Use the following notation and explicitly state foreign key relationships. For instance:

$R(\underline{a}, b)$

$S(\underline{c}, d)$ -- c is a foreign key to R

