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Database Concepts

Exercise 6

1. Find all candidate keys for relation $R(ABCDE)$. Following functional dependencies exist in relation R:

$$A \to B, BC \to E, ED \to A$$

2. Given relation $R(ABCDEF)$ and following functional dependencies:

$$F = \{A \to BC, E \to ABC, F \to CD, CD \to BEF\}$$

   Determine all candidate keys!

3. Given two sets of functional dependencies:

   - $A \to B, A \to C, CD \to E, B \to D$
   - $A \to BC, AD \to E, DB \to B, A \to D$

   Test in a systematic way, whether both sets are equivalent, one set is a superset, or no set is semantically contained within the other set.

4. Given a relation about drinking suppliers:

Company	Product	Export	Caffeine Content	Popularity
Meier	tea	yes	16	high
Meier	$coffee$	yes	8	low
Dept	$\{tea, coffee\}$	no	17	high
HB	$\{tea, coffee\}$	no	30	low

   Following functional dependencies exist:

$$(Company, Product \to Export, CaffeineContent, Popularity),$$
$$(Company \to Export), (CaffeineContent \to Popularity),$$
$$(CaffeineContent \to Company).$$

   Transfer the relation step-by-step into the **Boyce-Codd-Normal Form (BCNF)**. Present each intermediate result!

5. Given the following functional dependencies over the schema R(A,B,C,D):

$$A \to C, B \to CD$$

Which of the following decompositions is lossless and/or dependency preserving?

- $R_1(A, B), R_2(A, C, D)$
- $R_1(A, C), R_2(B, C, D)$
- $R_1(A, B), R_2(B, C, D)$
- $R_1(A, B, C), R_2(B, C, D)$

Good Luck!