**FINAL EXAM**

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**Question 5**

**Q5.1.**

­By applying Decomposition on AB 🡪 DE, we get AB 🡪 D and AB 🡪 E

By applying Augmentation on C 🡪 A with B, we get CB 🡪 AB

By applying Transitivity on CB 🡪 AB and AB 🡪 D, we get CB 🡪 D

Thus, 𝔖 ⊨ CB 🡪 D holds.

**Q5.2.**

Minimal cover: {AB 🡪 D, C 🡪 E, D 🡪 C, E 🡪 A}

Key: ABF, (BCF, BEF, BDF)

**Q5.3.**

The relational schema is not in BCNF as AB 🡪 D is a violation. We apply the Decompose-BCNF algorithm with the following steps:

* First, we split R using AB 🡪 D, resulting in R1 = (A, B, C, D, E) and R2 = (A, B, F).
* R2 is in BCNF as no non-trivial functional dependency holds in R2.
* Next, we split R1 using the violation C 🡪 E, resulting in R1,1 = (C, E, A) and R1,2 = (C, B, D).
* Next, we split R1,1 using the violation E 🡪 A, resulting in R1,1,1 = (E, A) and R1,1,2 = (E, C).
* R1,1,1 and R1,1,2 are in BCNF as they have two attributes each.
* Next, we split R1,2 using the violation D 🡪 C, resulting in R1,2,1 = (D, C) and R1,2,2 = (D, B).
* R­1,2,1 and R­1,2,2 are in BCNF as they have two attributes each.