CIS 631: DATA MANAGEMENT SYSTEMS DESIGN

ASSIGNMENT 3

EXERCISE

Consider a relation R(ABCDEFGHIJ) with the following set of functional dependencies
$\mathbf{G} = \{ F \rightarrow AB, CD \rightarrow E, C \rightarrow FG, H \rightarrow IJ, D \rightarrow H \}$

1. Is CDE a superkey of R (w.r.t. $\mathbf{G}$)?

2. Is CDE a key of R (w.r.t. $\mathbf{G}$)?

3. Apply the appropriate algorithm to determine a key for R (w.r.t. $\mathbf{G}$).

4. Apply the appropriate algorithm to determine all the keys for R (w.r.t. $\mathbf{G}$).

5. Determine the prime attributes of R.

6. Is R in BCNF (w.r.t. $\mathbf{G}$)?

7. Is R in 3NF (w.r.t. $\mathbf{G}$)?

8. Determine whether the decomposition $\mathbf{D} = \{ $ CDE, CFG, DH, HIJ, FAB $ \}$ has (i) the dependency preservation property and (ii) the lossless join property, with respect to $\mathbf{G}$. Also determine which normal form each relation in the decomposition is in.