Assignment 2

Please make sure that you always use notations consistent with lecture notes. Different notations will not be accepted. The deadline for assignment 2 is:

Mon 08 Apr, 10:00 am

Question 1 (8 marks)

Consider a relation $R(A, B, C, D, E, G, H, I, J)$ and its FD set $F = \{AB \rightarrow CE, D \rightarrow GH, E \rightarrow BCD, C \rightarrow DI, H \rightarrow G, EH \rightarrow I\}$.

1) Check if $C \rightarrow J \in F^+$. (1 mark)

2) List all the candidate keys for R. (2 marks)

3) Find a minimal cover F_m for F. (2 marks)

4) Decompose into a set of 3NF relations if it is not in 3NF. Make sure your decomposition is dependency-preserving and lossless-join. Justify your answers. (3 marks)

Question 2 (12 marks)

Consider a relation $R(A, B, C, D, E, G, H, I, J)$ and its FD set $F = \{AB \rightarrow CE, D \rightarrow GH, E \rightarrow BCD, C \rightarrow DI, H \rightarrow G, EH \rightarrow I\}$.

1) How many super keys can be found for R? Compute the total number of super keys and list 5 of them. (2 marks)

2) Determine the highest normal form of R with respect to F. Justify your answer. (2 marks)

3) Regarding F, is the decomposition $R_1 = \{ABCDE\}$, $R_2 = \{EGH\}$, $R_3 = \{EIJ\}$ of R dependency-preserving? Please justify your answer. (2 marks)

4) Regarding F, is the decomposition $R_1 = \{ABCDE\}$, $R_2 = \{EGH\}$, $R_3 = \{EIJ\}$ of R lossless-join? Please justify your answer. (3 marks)

5) Decompose it into a collection of BCNF relations if it is not in BCNF. Make sure your decomposition is lossless-join and briefly justify your answers. (3 marks)

Assignment Submission

We accept electronic submissions only. Please submit your assignments as follows: