Problem Set for Normalization

1. Suppose that the decomposition of the schema R = (A, B, C, D, E) with a set of functional dependencies $F = \{A \rightarrow BC,\ CD \rightarrow E,\ B \rightarrow D,\ E \rightarrow A\}$ into

R_1 = (A, B, C) and R_2 = (A, D, E).

(1) Show that this decomposition is a lossless one;

(2) Show that this decomposition is not dependency-preserving.

2. Given a relational schema R = (A, B, C, D, E) with a set of functional dependencies

$F = \{A \rightarrow BC,\ CD \rightarrow E,\ B \rightarrow D,\ E \rightarrow A\}$

(1) List the candidate keys for R;

(2) Find the canonical cover F_c from the given set F.

3. Given a relational schema R = (A, B, C, D, E, G) with a set of functional dependencies

$F = \{AC \rightarrow G,\ D \rightarrow EG,\ BC \rightarrow D,\ CG \rightarrow BD,\ ACD \rightarrow B,\ CE \rightarrow AG\}$

(1) Find the canonical cover F_c from the given set F;

(2) Determine if the set is in 3NF. If not, please decompose R into 3NF.