

CMSC 424. Homework 2

Due: March 13

1. Problem 7.6: Compute the closure of the following set F of functional dependencies for relation schema $R = (ABCDE)$
 $A \rightarrow BC$
 $CD \rightarrow E$
 $B \rightarrow D$
 $E \rightarrow A$

List all candidate keys for R

2. Problem 7.20: Consider the following proposed rule for functional dependencies: If $A \rightarrow B$ and $C \rightarrow B$, then $A \rightarrow C$. Prove that this rule is not sound by showing a relation r that satisfies $A \rightarrow B$ and $C \rightarrow B$ but not $A \rightarrow C$.
3. Problem 7.1: Suppose that we decompose the schema $R = (A,B,C,D,E)$ into
 (A,B,C)
 (A,D,E)

Show that this decomposition is a lossless decomposition if the following set F of functional dependencies holds:

$A \rightarrow BC$
 $CD \rightarrow E$
 $B \rightarrow D$
 $E \rightarrow A$

4. Problem 7.25: Give a lossless decomposition into BCNF of schema R from problem 3
5. Problem 7.27: Give a lossless, dependency-preserving decomposition into 3NF of schema R from problem 3.