# B461 Assignment 4: Functional Dependencies and Normal Forms (Due November 10) 

November 3, 2009

1. Prove or disprove the following inference rules for functional dependencies.
(a) $\{A \rightarrow C, B \rightarrow D\}$ implies $A B \rightarrow C$
(b) $\{B C \rightarrow D, C \rightarrow A\}$ implies $B A \rightarrow D$
(c) $\{A \rightarrow C E, B E \rightarrow D, E \rightarrow A\}$ implies $E \rightarrow C$
(d) $\{B \rightarrow C, D \subseteq C\}$ implies $B \rightarrow D$
2. Consider the following two sets of FD's.
$F=\{A \rightarrow C, A C \rightarrow D, E \rightarrow A D, E \rightarrow H\}$ and $G=\{A \rightarrow C D, E \rightarrow A H\}$
Check if they are equivalent.
3. Given the relation $\mathrm{R}=\{\mathrm{A}, \mathrm{B}, \mathrm{C}, \mathrm{D}, \mathrm{E}, \mathrm{F}, \mathrm{GH} \mathrm{H}, \mathrm{I}, \mathrm{J}\}$ and the set of functional dependencies $F=\{A B \rightarrow C, A \rightarrow D E, B \rightarrow F, F \rightarrow G H, D \rightarrow I J\}:$
(a) Give a key for R?
(b) Decompose R into $B C N F$. Is the decomposition lossless? Is it dependency preserving?
