CS2102 Database Systems
2013/2014 Semester I
Tutorial #5 Functional Dependencies

1. Is the following rule correct?

   $\forall X \in R\ \forall Y \in R$ (if $X \rightarrow Y$ then $Y \subseteq X$)

2. The following rule is called pseudo-transitivity. Use Armstrong axioms to prove it.

   $\forall X \in R\ \forall Y \in R\ \forall Z \in R\ \forall W \in R$ (if $X \rightarrow Y$ and $Z \rightarrow W$ and $Z \subseteq Y$, then $X \rightarrow W$)

3. Consider the set of functional dependencies:

F = { {A} → {B}, {C} → {D}, {B, D} → {E}, {D} → {A, D}, {A, C} → {E, B} } on the relation scheme R = {A, B, C, D, E}.

   a. Give an example instance of R that complies with the functional dependencies.

   b. Give an example instance of R that violates the functional dependencies.

   c. Compute F^+, the closure of F.

   d. Give an example of a trivial functional dependency in F^+.

   e. Give an example of a non-trivial functional dependency in F^+.

   f. Compute $\{C\}^+$, the closure of the set of attributes {C}.

   g. Compute a minimal cover of F.