Lecture Prep for Week 9

1. Suppose we have a relation on attributes A, B, C, D, E, and F, and these functional dependencies hold:
   $S = \{\ B \rightarrow DE, \quad BF \rightarrow C, \quad CF \rightarrow B, \quad DF \rightarrow AE\ \}$.

   (a) Compute B^+.
   (b) Compute CF^+.
   (c) Compute DF^+.
   (d) Compute BC^+.
   (e) Compute ABC^+.

   Write your closures in alphabetical order. For example, rather than $BDFA$, write $ABDF$.

2. Again, suppose we have a relation on attributes A, B, C, D, E, and F, and these functional dependencies hold: $S = \{\ B \rightarrow DE, \quad BF \rightarrow C, \quad CF \rightarrow B, \quad DF \rightarrow AE\ \}$.

   (a) Does it follow from S that $B \rightarrow A$?
   (b) Does it follow from S that $CF \rightarrow E$?
   (c) Does it follow from S that $DF \rightarrow B$?
   (d) Does it follow from S that $BD \rightarrow C$?
   (e) Does it follow from S that $BFC \rightarrow A$?

   Write "yes" or "no" for each, and show your rough work.

3. Suppose we have a relation with attributes $ABCDE$ and these functional dependencies: $S = \{\ A \rightarrow D$, $B \rightarrow A$, $C \rightarrow A$, $D \rightarrow CE.\ \}$ Project the functional dependencies onto the attribute set ABD.

   Show all your steps, and clearly label your final anwer.

4. Consider relation $R(A, B, C, D, E, F)$ with functional dependencies:

   $$S = \{\ CD \rightarrow A, \quad B \rightarrow EF, \quad A \rightarrow BC, \quad F \rightarrow D\ \}$$

   Create an instance of R that satisfies its FDs and has redundant data. Identify redundancy by circling a single value in the table that could be erased and yet we would know what its value *must* be. Thought exercise: what does it have to do with the FDs?

Submit your work in a pdf file called "prep9.pdf" on MarkUs.