CSE 132A

Practice Problems on Schema Design

1. Consder a relation R with attributes $ABCD$ and a decomposition $\rho = \{AB, BC, CD\}$ for R. Show that ρ has lossless join with respect to $F = \{B \to A, C \to B\}$.

2. Let R be a relation over attributes $ABCDE$, and

$$F = \{AB \to C, C \to E, E \to C, C \to D, AB \to E\}.$$

Show that the decomposition $\rho = \{ABC, ADE, CE\}$ is dependency preserving with respect to F.

3. Minimize the set of fds

$$G = \{A \to C, AB \to C, C \to DI, CD \to I, EC \to AB, EI \to C\}.$$

4. Suppose we have a database for an investment firm, consisting of the following attributes: B (broker), O (office of a broker), I (investor), S (stock), Q (quantity of stock owned by an investor), and D (divident paid by a stock), with the following functional dependencie: $S \to D, I \to B, IS \to Q, B \to O$.

(a) Find a key for the relation R over attributes $BOSQID$.

(b) How many keys does R have? Prove your answer.

(c) Find a lossless join decomposition of R into Boyce-Codd Normal Form.

(d) Find a decomposition of R into Third Normal Form, having lossless join and preserving dependencies.

5. Let R be a relation over attributes $ABCD$ and
$F = \{AB \to CD, D \to C, B \to C\}$.

(a) Find a BCNF decomposition for R and F that has lossless join.

(b) Is the decomposition found in (a) dependency preserving with respect to F? If not, go to (c).

(c) Find a 3NF decomposition for R and F that has lossless join and is dependency preserving.