Assignment 3

Q1. Given the relation r(A, B, C) and the functional dependencies A → B and B → C, give a lossless join dependency preserving decomposition of R into BCNF.

Q2. Consider the following functional dependencies for relation schema
R = (A, B, C, D, E): $A \rightarrow BC$, $CD \rightarrow E$, $B \rightarrow D$, $E \rightarrow A$. Compute A^+

Q3. Consider the following set *F* of functional dependencies on the relation schema

r(*A*, *B*, *C*, *D*, *E*, *F*):
$A \rightarrow BCD$, $BC \rightarrow DE$, $B \rightarrow D$, $D \rightarrow A$

1. Compute B^+.
2. Prove (using Armstrong's axioms) that *AF* is a superkey.

Compute a canonical cover for the above set of functional dependencies *F*; give each step of your derivation with an explanation.

3. Give a 3NF decomposition of *r* based on the canonical cover.
4. Give a BCNF decomposition of *r* using the original set of functional dependencies.

Q4. Given the following functional dependencies $A \rightarrow BCD$, $CD \rightarrow E$, $B \rightarrow D$, $E \rightarrow A$, $AD \rightarrow E$

1. Find a canonical cover of the above set of dependencies (you must explain how you arrived at the answer).
2. Normalize the relation to 3NF (again, you must explain how you arrived at the answer).