

Homework #5

Name:

Student ID:

Assigned Date: 2021-12-07

1. For each of the following relation schemas and dependencies
 - (a) $R(A, B, C, D)$ with MVD's $A \twoheadrightarrow B$ and $A \twoheadrightarrow C$. (10%)
 - (b) $R(A, B, C, D)$ with MVD's $A \twoheadrightarrow B$ and $B \twoheadrightarrow CD$. (10%)do the following:
 - i) Find all the 4NF violations.
 - ii) Decompose the relations into a collection of relation schemas in 4NF.

2. Consider a relation with schema $R(A, B, C, D)$ and FD's $AB \rightarrow C$, $C \rightarrow D$, and $D \rightarrow A$.
 - (a) What are all the nontrivial FD's that follow from the given FD's? You should restrict yourself to FD's with single attributes on the right side. (10%)
 - (b) What are all the candidate keys of R ? (10%)
 - (c) What are all the super-keys for R that are not candidate keys? (10%)

3. For each of the following relation schemas and sets of FD's:
 - (a) $R(A, B, C, D)$ with FD's $AB \rightarrow C$, $C \rightarrow D$, and $D \rightarrow A$. (10%)
 - (b) $R(A, B, C, D)$ with FD's $B \rightarrow C$ and $B \rightarrow D$. (10%)
 - (c) $R(A, B, C, D)$ with FD's $AB \rightarrow C$, $BC \rightarrow D$, $CD \rightarrow A$, and $AD \rightarrow B$. (10%)
 - (d) $R(A, B, C, D)$ with FD's $A \rightarrow B$, $B \rightarrow C$, $C \rightarrow D$, and $D \rightarrow A$. (10%)
 - (e) $R(A, B, C, D, E)$ with FD's $AB \rightarrow C$, $DE \rightarrow C$, and $B \rightarrow D$. (10%)do the following:
 - i) Indicate all the BCNF violations. Do not forget to consider FD's that are not in the given set, but follow from them. However, it is not necessary to give violations that have more than one attribute on the right side.
 - ii) Decompose the relations, as necessary, into collections of relations that are in BCNF.