

CE 223 - DATABASE SYSTEMS

WEEK #3 RECITATION QUESTIONS

- 3.1.1
- 3.2.2
- 3.3.1
- 3.4.1 a

3.1.1 (pg 71)

Consider a relation about people in the United States, including their name, Social Security number, street address, city, state, ZIP code, area code, and phone number (7 digits). What FD's would you expect to hold? What are the keys for the relation?

To answer this question, you need to know something about the way these numbers are assigned. For instance, can an area code straddle two states? Can a ZIP code straddle two area codes? Can two people have the same Social Security number? Can they have the same address öor phone number?

3.2.2 a (pg 83)

Consider a relation with schema $S(A, B, C, D)$ with FD's $A \rightarrow B$, $B \rightarrow C$, and $B \rightarrow D$.

- 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.
- b) What are all the keys of S ?
- c) What are all the superkeys for S that are not keys?

3.2.2 b (pg 83)

$T(A, B, C, D)$ with FD's $AB \rightarrow C$, $BC \rightarrow D$, $CD \rightarrow A$, and $AD \rightarrow B$.

- 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.
- b) What are all the keys of T ?
- c) What are all the superkeys for T that are not keys?

3.2.2 c (pg 83)

U(A, B, C, D) with FD's $A \rightarrow B$, $B \rightarrow C$, $C \rightarrow D$, 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.
- b) What are all the keys of U?
- c) What are all the superkeys for U that are not keys?

3.3.1 a (pg 92)

$R(A, B, C, D)$ with FD's $AB \rightarrow C$, $C \rightarrow D$, and $D \rightarrow A$.

- 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.

3.3.1 b (pg 92)

$R(A, B, C, D)$ with FD's $B \rightarrow C$, and $B \rightarrow D$.

- 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.

3.3.1 c (pg 92)

$R(A, B, C, D)$ with FD's $AB \rightarrow C$, $BC \rightarrow D$, $CD \rightarrow A$, and $AD \rightarrow B$.

- 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.

3.3.1 d (pg 92)

$R(A, B, C, D)$ with FD's $A \rightarrow B$, $B \rightarrow C$, $C \rightarrow D$, and $D \rightarrow A$.

- 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.

3.3.1 e (pg 93)

$R(A, B, C, D, E)$ with FD's $AB \rightarrow C$, $DE \rightarrow C$, and $B \rightarrow D$.

- 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.

3.4.1 a (pg 102)

Let $R(A, B, C, D, E)$ be decomposed into relations with the following three sets of attributes: $\{A, B, C\}$, $\{B, C, D\}$, and $\{A, C, E\}$. For the following sets of FD's $B \rightarrow E$, and $CE \rightarrow A$, use the chase test to tell whether the decomposition of R is lossless.

For those that are not lossless, give an example of an instance of R that returns more than R when projected onto the decomposed relations and rejoined.