

Assignment 6

1. 2) FDs: $\{A \rightarrow B, AB \rightarrow C, AB \rightarrow D, D \rightarrow G, DE \rightarrow F, DG \rightarrow C, DG \rightarrow H, F \rightarrow D\}$

$$X = \{A, B\}$$

Iterations: $AB \rightarrow C \Rightarrow X = \{A, B, C\}$
 $AB \rightarrow D \Rightarrow X = \{A, B, C, D\}$
 $D \rightarrow G \Rightarrow X = \{A, B, C, D, G\}$
 $DG \rightarrow H \Rightarrow X = \{A, B, C, D, G, H\}$

$$\{A, B\}^+ = \{A, B, C, D, G, H\}$$

b) $AB \rightarrow C$
 $ABD \rightarrow C$
 $ABDE \rightarrow C$
 $ABE \rightarrow C$
 $BD \rightarrow C$
 $BDE \rightarrow C$
 $BE \rightarrow C$

c) keys: AB
 BD
 BE

superkeys: ABC
 $ABCD$
 $ABCDE$
 $ABCE$
 ABD
 $ABDE$
 ABE

BCD
 $BCDE$
 BDE

d)

name	age	score
John Doe	19	5
John Doe	54	7
Jane Smith	19	5
Jane Smith	26	7

name age \rightarrow score

name \rightarrow score
 age \rightarrow score } does not hold

2. Decomposition #1:

Input table: $R(A, B, C, D, E, F)$ Primary key: AB

Why it's a key: $AB \rightarrow C, C \rightarrow D \Rightarrow AB \rightarrow D, D \rightarrow E \Rightarrow AB \rightarrow E, AB \rightarrow F$

We can get all other attributes from AB , therefore it is a key

FD $C \rightarrow D$ violates BCNF

$$\{C\}^+ = \{C, D, E\}$$

$$R \Rightarrow \begin{matrix} R1(C, D, E) \\ R2(A, B, C, F) \end{matrix} \text{ in BCNF}$$

Decomposition #2:

Input table: $R2(A, B, C, F)$ Primary key: AB

Why it's a key: $AB \rightarrow C, AB \rightarrow F$, we can get all other attributes from AB , therefore it's a key

FD $B \rightarrow F$ violates BCNF

$$\{B\}^+ = \{B, F\}$$

$$R2 \Rightarrow \begin{matrix} R3(B, F) \\ R4(A, B, C) \end{matrix} \text{ both in BCNF}$$

Set of tables that resulted from decomposition:

$R1(C, D, E)$
 $R3(B, F)$
 $R4(A, B, C)$