

CS4416 - Tutorial 3

Functional Dependencies and Keys

1. Let $R(ABCDEFGH)$ satisfy the following functional dependencies: $A \rightarrow B$, $CH \rightarrow A$, $B \rightarrow E$, $BD \rightarrow C$, $EG \rightarrow H$, $DE \rightarrow F$. Which of the following FD's is also guaranteed to be satisfied by R ?

- a. $CEG \rightarrow AB$ yes
- b. $BDG \rightarrow AE$ yes
- c. $ADE \rightarrow CH$ no
- d. $CDE \rightarrow AF$ no

2. Determine the keys and superkeys of the relation $R(ABCDEF)$ with FD's:

$AEF \rightarrow C$, $BF \rightarrow C$, $EF \rightarrow D$, and $ACDE \rightarrow F$

Ans. Keys $ABCDE$, $ABEF$.

3. Find all keys of the relation $R(ABCDEFG)$ with functional dependencies

$AB \rightarrow C$, $CD \rightarrow E$, $EF \rightarrow G$, $FG \rightarrow E$, $DE \rightarrow C$, and $BC \rightarrow A$

Ans. $ABDF$, $BCDF$, $BDEF$, $BDFG$

4. Relation $R(A,B,C)$ currently has only the tuple $(0,0,0)$, and it must always satisfy the functional dependencies $A \rightarrow B$ and $B \rightarrow C$. What condition(s) must be obeyed by any tuple that may be inserted without violating either of these FD's? Identify from the list below the tuple that may be inserted into R legally.

- a. $(1,2,3)$ yes
- b. $(0,1,1)$ no
- c. $(0,0,1)$ no