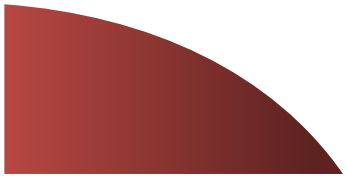


Identifying Equivalence of FDs





Equivalence set of FDs

- $F: \{ \}$ $G: \{ \}$

i. Is F cover G? $G^+ \subseteq F^+$

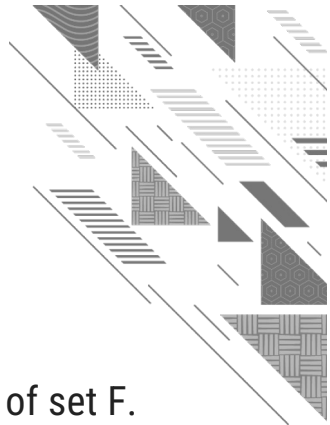
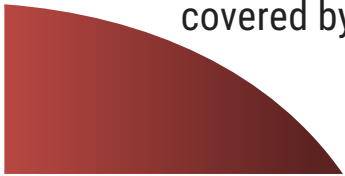
Following steps are followed to determine whether F covers G or not—

- a. Take the functional dependencies of set G into consideration.
- b. For each functional dependency $X \rightarrow Y$ of G, find the closure of X using the functional dependencies of set F.
- c. If the functional dependencies of set F has determined all those attributes that were determined by the functional dependencies of set G, then it means F covers G.

ii. Is G cover F? $F^+ \subseteq G^+$

iii. Are both equivalent? $G^+ \equiv F^+$

If F1 and F2 are said to be equivalent then all FDs in F1 must be covered by F2 and all FDs in F2 must be covered by F1.





Q. 1 F: $\{A \rightarrow B, B \rightarrow C, C \rightarrow D\}$; G: $\{A \rightarrow BC, C \rightarrow D\}$

i. Is F cover G?

Take closure of L.H.S. attributes' of G from F's FD.

$A^+ = \{A, B, C, D\}$ i.e., $A \rightarrow BC$ of G will be covered from A^+ .

$C^+ = \{C, D\}$ i.e., $C \rightarrow D$ of G will be covered from C^+ .

Yes.

ii. Is G cover F?

Take closure of L.H.S. attributes' of F from G's FDs.

$A^+ = \{A, B, C, D\}$ i.e., $A \rightarrow B$ of F will be covered from A^+ .

$B^+ = \{B\}$

$C^+ = \{C, D\}$ i.e., $C \rightarrow D$ of F will be covered from C^+ .

No.

Because $B \rightarrow C$ can't be covered.





Q. 2 P: $\{A \rightarrow B, AB \rightarrow C, D \rightarrow ACE\}$;

Q: $\{A \rightarrow BC, D \rightarrow AE\}$

i. Is P cover Q?

Take closure of L.H.S. attributes' of Q from P's FD.

$A^+ = \{A, B, C, D, E\}$ i.e., $A \rightarrow BC$ of Q will be covered from A^+ .

$D^+ = \{D, A, E\}$ i.e., $D \rightarrow AE$ of Q will be covered from D^+ .

Yes.

ii. Is Q cover P?

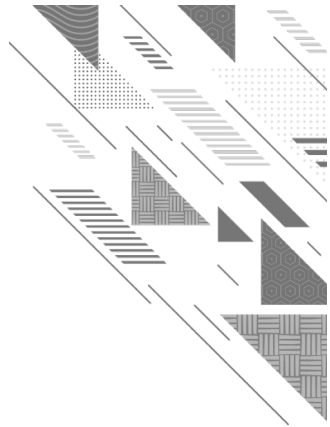
Take closure of L.H.S. attributes' of P from Q's FDs.

$A^+ = \{A, B, C\}$ i.e., $A \rightarrow B$ of P will be covered from A^+ .

$AB^+ = \{A, B, C\}$ i.e., $AB \rightarrow C$ of P will be covered from AB^+ .

$D^+ = \{D, A, E, B, C\}$ i.e., $D \rightarrow ACE$ of P will be covered from D^+ .

Yes. Thus, $P \equiv Q$.





Q. 3 $F1 = \{A \rightarrow C, AC \rightarrow D, E \rightarrow AD, E \rightarrow H\}$; $F2 = \{A \rightarrow CD, E \rightarrow AH\}$

i. Is $F1$ cover $F2$?

Take closure of L.H.S. attributes' of $F2$ from $F1$'s FD.

$A^+ = \{A, C, D\}$ i.e., $A \rightarrow CD$ of $F2$ will be covered from A^+ .

$E^+ = \{E, A, D, H, C\}$ i.e., $E \rightarrow AH$ of $F2$ will be covered from E^+ .

Yes.

ii. Is $F2$ cover $F1$?

Take closure of L.H.S. attributes' of $F1$ from $F2$'s FDs.

$A^+ = \{A, C, D\}$ i.e., $A \rightarrow C$ of $F1$ will be covered from A^+ .

$AC^+ = \{A, C, D\}$ i.e., $AC \rightarrow D$ of $F1$ will be covered from AC^+ .

$E^+ = \{D, A, E, H, C\}$ i.e., $E \rightarrow AD, E \rightarrow H$ of $F1$ will be covered from E^+ .

Yes.

Thus, $F1 \equiv F2$.



Q. 4 Check the following sets F1 and F2 of FDs for the equivalence.

$F1 = \{XY \rightarrow W, Y \rightarrow Z, WZ \rightarrow P, WP \rightarrow QR, Q \rightarrow X\}$

$F2 = \{XY \rightarrow Q, WX \rightarrow PZ, X \rightarrow ZP, Q \rightarrow ZR\}$

i. Is F1 cover F2?

Take closure of L.H.S. attributes' of F2 from F1's FD.

$XY^+ = \{X, Y, W, Z, P, Q, R, X\}$ i.e., $XY \rightarrow Q$ of F2 will be covered from XY^+ .

$WX^+ = \{W, X\}$

$X^+ = \{X\}$

$Q^+ = \{Q, X\}$

No. because FDs $WX \rightarrow PZ, X \rightarrow ZP, Q \rightarrow ZR$ of F2 cant be covered from F1.

ii. Is F2 cover F1?

Take closure of L.H.S. attributes' of F1 from F2's FDs.

$XY^+ = \{X, Y, Q, Z, R, P\}$

$Y^+ = \{Y\}$

$WZ^+ = \{W, Z\}$

$WP^+ = \{W, P\}$

$Q^+ = \{Q, Z, R\}$

No. none of the FDs of F1 covered from F2.

Thus, neither F1 covers F2, nor F2 covers F1.