Q: Given below are two sets of FD's for a relation R(A, B, C, D, E). Are they equivalent.

(i) $A \to B$, $AB \to C$, $D \to AC$, $D \to E$

(ii) $A \to BC$, $D \to AE$.

Soln :-

$A \to B$
$AB \to C$
$D \to AC$
$D \to E$

$\Rightarrow$

$A \to B$
$AB \to C$
$D \to A$
$D \to C$
$D \to E$

with pseudo transitivity

$A \to B$, $AB \to C$
$\Rightarrow A \to C$

$\therefore$ $D \to A$, $A \to C \Rightarrow D \to C$

$D \to A$, $A \to B \Rightarrow D \to B$

$\therefore$ $D \to C$, $D \to B$, $D \to E \Rightarrow D \to ECB$

(ii) Now Consider $A \to BC$, $D \to AE$

$A \to BC$
$D \to AE$

$\Rightarrow$

$A \to B$
$A \to C$
$D \to A$
$D \to E$

$\Rightarrow$

By pseudo transitive

$D \to A$, $A \to C \Rightarrow D \to C$

$D \to A$, $A \to B \Rightarrow D \to B$

$\therefore$ $D \to C$, $D \to B$, $D \to E$

$\therefore \Rightarrow$ Both FD's are equivalent

Q. Consider the following relation for

CARSALE (Car-no, Date-sold, Salesman_NO, Commission, Discount)

Assume a car can be sold by multiple salesman and hence primary key is {Car_no, Salesman-no}

Additional dependencies are

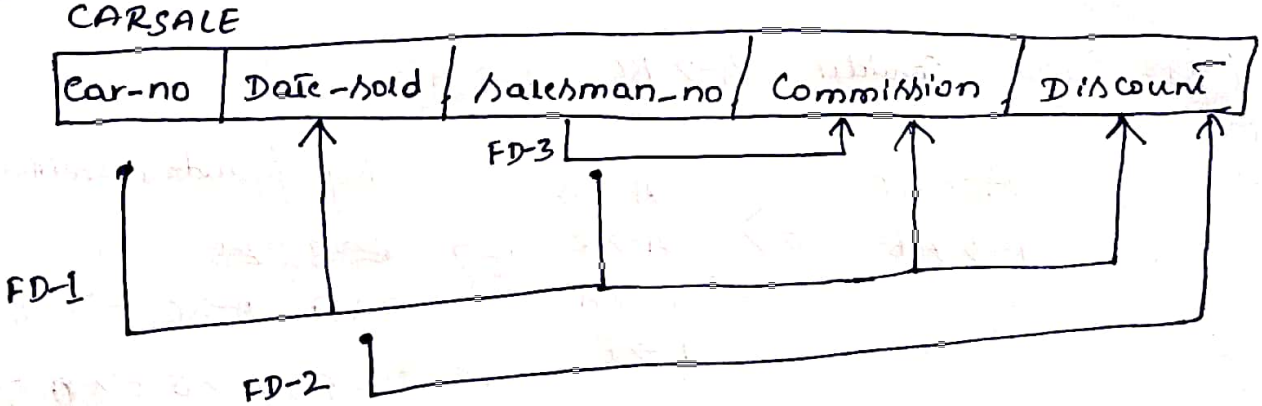
Date_sold → Discount

Salesman_no → Commission

(i) is this relation in 1NF, 2NF or 3NF? why or why not?

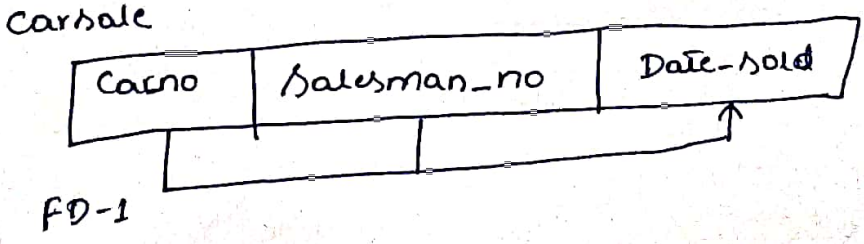
(ii) How would you normalize this completely.

Soln:-

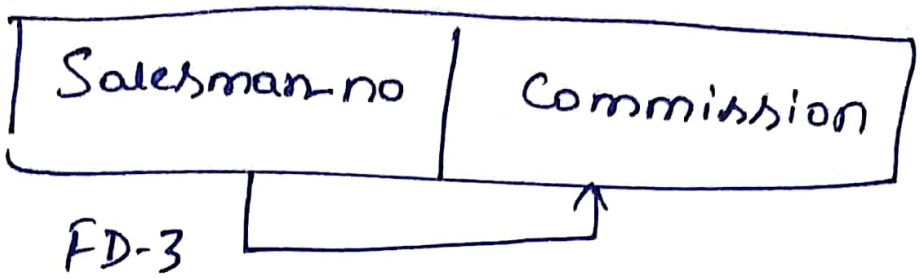


It is in 1 NF

After normalizing upto 3NF.



Car_Sale2



Car-Sale 3