

Normalise to 3NF

1. $R(\underline{a}, b, c, R1(\underline{d}, \underline{e}))$ with FD's:
 $a \rightarrow \{b, c\}$
 $c \rightarrow \{d, e\}$
2. $R(\underline{a}, \underline{b}, c, d, e, \{f\})$ with FD's:
 $\{a, b\} \rightarrow c$
 $a \rightarrow d$
 $c \rightarrow e$
3. $R(\underline{a}, \underline{b}, c, d, e, \{f\})$ with FD's:
 $b \rightarrow c$
 $a \rightarrow d$
 $c \rightarrow e$

1. $R(\underline{a}, b, c, R1(\underline{d}, \underline{e}))$ with FD's:

$$\textcircled{a} \rightarrow \{b, c\}$$

$$c \rightarrow \{d, e\}$$

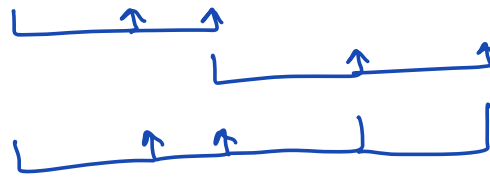
$$R'(\underline{a}, b, c)$$

$$R1(\underline{a}, \underline{d}, \underline{e})$$

R' & $R1$ in 1NF & 2NF & 3NF

$$R(\underline{a}, b, c, \underline{d}, \underline{e})$$

✓ 1NF



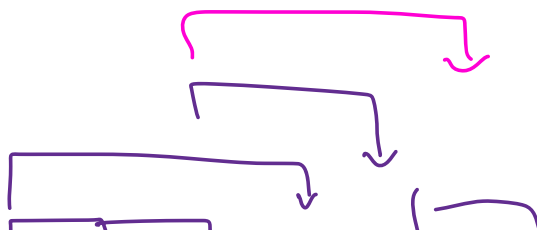
2NF?

$$R(\textcircled{a}, b, c, d, e)$$

✓ 1NF & 2NF

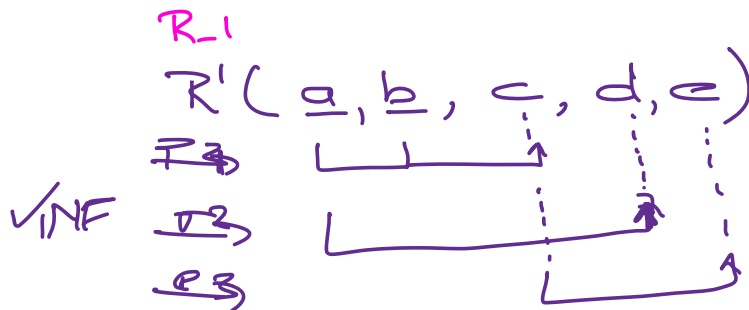


3NF?



2. $R(\underline{a}, \underline{b}, \overset{\downarrow}{c}, d, e, \underline{\{f\}})$ with FD's:

F 1 $\{a, b\} \rightarrow c$
 2 $a \rightarrow d$
 3 $c \rightarrow e$



R_{1-1}
 $R''(\underline{a}, \underline{b}, c, e)$

1
 3
 $\checkmark 2NF$

R_{1-2}
 $R_2(\underline{a}, d)$

2
 $\checkmark 2NF \ \& \ 3NF$

$3NF \ X$

R_{1-1-1}
 $R'''(\underline{a}, \underline{b}, c)$

R_{1-1-2}
 $R_3(\underline{c}, e)$

$\checkmark 3NF$

$\checkmark 3NF$

Referential integrity
 $\{R_1.a\} \rightarrow R'''$
 $f.k \rightarrow p.k$

3. $R(\underline{a}, \underline{b}, c, d, e, \{f\})$ with FD's:

$b \rightarrow c$

$a \rightarrow d$

$c \rightarrow e$