

Tutorial 5-103 -s/725018

Problem 1

a) ① $D \rightarrow AC$

Does not hold since tuples

A	B	C	D	E	F
1	1	2	3	0	4
2	1	2	3	0	4

don't hold since when $D=3$ AB is either $\{1,1\}$ or $\{2,1\}$

② $AB \rightarrow DE$ Holds.

③ $FD \rightarrow E$ does not hold since:

A	B	C	D	E	F
1	1	2	3	0	4
2	1	2	3	1	4

when $FD = \{3, 4\}$ $E = \{0\}$ or $\{1\}$

④ Holds $C \rightarrow F$

b) We can break down the FD's into their fundamental forms using Armstrong's axioms:

$\{ D \rightarrow AC, AB \rightarrow DE, FD \rightarrow E, C \rightarrow F \}$

Fundamental form $\Sigma' = \{ D \rightarrow A, D \rightarrow C, AB \rightarrow D, AB \rightarrow E, FD \rightarrow E, C \rightarrow F \}$

We can use this to derive new forms.

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|-----------------------|-----|------------------------|-----|
| ① $AC \rightarrow E$ | NO | ⑤ $AD \rightarrow CF$ | NO |
| ② $BD \rightarrow EF$ | NO | ⑥ $ABC \rightarrow DF$ | YES |
| ③ $EF \rightarrow BC$ | NO | ⑦ $DEF \rightarrow AB$ | NO |
| ④ $BC \rightarrow BF$ | YES | ⑧ $DE \rightarrow AE$ | NO |

- ⑨ $CO \rightarrow DE$ NO
 ⑩ $BF \rightarrow AC$ NO
 ⑪ $CO \rightarrow ED$ YES
 ⑫ $DE \rightarrow AF$ NO

c) Show the above obvious:

① $BC \rightarrow BF$; we have : $C \rightarrow F$
 $BC \rightarrow BF$ } using augmentation 'B'

② $ABC \rightarrow DF$; we have : $AB \rightarrow D$ decomposition
 (1) $ABC \rightarrow DC$ augmentation 'C'
 we also have : $C \rightarrow F$
 (2) $DC \rightarrow DF$ augmentation 'D'
 (1) + (2) using transitivity we get:
 $ABC \rightarrow DF$

③ $CO \rightarrow ED$; we have : $C \rightarrow F$
 $CO \rightarrow FD$ = augmentation
 transitivity with
 $CO \rightarrow E \leftarrow FD \rightarrow E$
 $CO \rightarrow ED$ ← Augmentation with 'O'