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1.

(a) $f(A,B,C,D)=\sum m(1,2,7,12,15)+d(5,9,10,11,13)$

真值表：

	A	B	C	D	f
0	0	0	0	0	0
1	0	0	0	1	1
2	0	0	1	0	1
3	0	0	1	1	0
4	0	1	0	0	0
5	0	1	0	1	X
6	0	1	1	0	0
7	0	1	1	1	1
8	1	0	0	0	0
9	1	0	0	1	X
10	1	0	1	0	X
11	1	0	1	1	X
12	1	1	0	0	1
13	1	1	0	1	X
14	1	1	1	0	0
15	1	1	1	1	1

卡诺图：

AB \ CD	00	01	11	10
00	0	0	1	0
01	1	X	X	X
11	0	1	1	X
10	1	0	0	X

原最简项：$B'CD'$，$C'D$，ABC'，BD

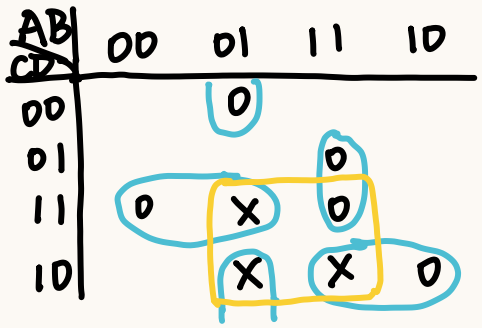
实际最简项：$B'CD'$，$C'D$，ABC'，BD

(b) $f(A,B,C,D) = \prod M(3,4,10,13,15) \cdot D(6,7,14)$

真值表:

	A	B	C	D	f
0	0	0	0	0	1
1	0	0	0	1	1
2	0	0	1	0	1
3	0	0	1	1	0
4	0	1	0	0	0
5	0	1	0	1	1
6	0	1	1	0	X
7	0	1	1	1	X
8	1	0	0	0	1
9	1	0	0	1	1
10	1	0	1	0	0
11	1	0	1	1	1
12	1	1	0	0	1
13	1	1	0	1	0
14	1	1	1	0	X
15	1	1	1	1	0

卡诺图.



质蕴涵项: $A+B'+D'$, $A+C'+D'$, $A'+B'+D'$, $A'+C'+D$, $B'+C'$

实质蕴涵项: $A+B'+D'$, $A+C'+D'$, $A'+B'+D'$, $A'+C'+D'$

2. $f(A,B,C,D)=\sum m(0,1,4,7,9,12)+d(8,11,15)$

最小项	ABCD	
0	0000	✓
1	0001	✓
4	0100	✓
8	1000	✓
9	1001	✓
12	1100	✓
7	0111	✓
11	1011	✓
15	1111	✓

最小项	ABCD	
0,1	000_	✓
0,4	0_00	✓
0,8	_000	✓
1,9	_001	✓
8,9	100_	✓
4,12	_100	✓
8,12	1_00	✓
9,11	10_1	PI_3
7,15	_111	PI_4
11,15	1_11	PI_5

最小项	ABCD	
0,1,8,9	_00_	PI_1
0,4,8,12	__00	PI_2

✓ ✓ ✓ ✓

0 1 4 7 9 12.

	0	1	4	7	9	12
* PI_1	X	⊗			X	
PI_2	X		X			X
PI_3				X		
* PI_4				⊗		

⇒

	4	12
* PI_2	⊗	⊗

PI_3.

∴ 选 PI_1, PI_4, PI_2.

$$f(ABCD)=B'C'+C'D'+BCD$$

3.

	Next State X=0	Next State X=1	Present Out X=0	Present Out X=1
A	A	E	1	0
B	C	F	0	0
C	B	H	0	0
D	E	F	0	0
E	D	A	0	0
F	B	F	1	0
G	D	H	0	0
H	H	G	1	0

划分法

P_0 (A B C D E F G H)

out X=0: 1 0 0 0 0 1 0 1 (AFH)(BCDEG)

X=1: 0 0 0 0 0 0 0 0

P_1 (A F H)(B C D E G)

Next X=0	A	B	H	C B E D D (AH)(F)
Next X=1	E	F	G	F H F A H (AH)(F)

P_2 (A H)(F)(B C D E G)

Next X=0	A	H	B	C	B E D D
Next X=1	E	G	F	F	H F A H (BD)(CEG)

P_3 (AH)(F)(BD)(CEG)

Next X=0	A	H	B	C	E	B D D
Next X=1	E	G	F	F	F	H A H

N.D. ⇒ (AH)(BD)(CEG)(F)

$P_4 = P_3$. (AH)(F)(BD)(CEG)

∴ $A' = (AH)$

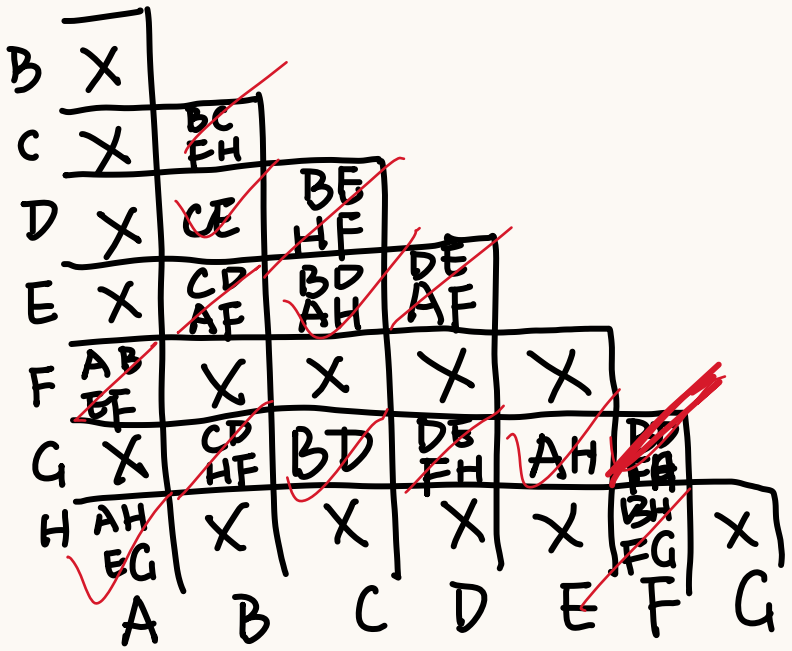
$B' = (BD)$

$C' = (CEG)$

$D' = (F)$

	Next X=0	Next X=1	Out X=0	Out X=1
A'	A'	C'	1	0
B'	C'	D'	0	0
C'	B'	A'	0	0
D'	B'	D'	1	0

蕴涵表法



A	(AH)
B	(BD)
C	(CG)
D	-
E	(EG)
F	-
G	-

∴ $P_k = (AH)(BD)(CEG)(F)$

$A' \quad B' \quad C' \quad D'$

∴

	Next X=0	Next X=1	Out X=0	Out X=1
A'	A'	C'	1	0
B'	C'	D'	0	0
C'	B'	A'	0	0
D'	B'	D'	1	0

4.

根据规则1: C' adj. D', B' adj. D'

规则2: A' adj. C', C' adj. D'. B' adj. A'

B' adj D'

∴ $A'-C'$, $A'-B'$, $C'-D'$, $B'-D'$

左相邻

∴ $A'-C'-D'-B'$

或 $A'-B'-D'-C'$

∴ 编码.

	①	②	③	④	⑤	⑥	⑦	⑧
A'	00	01	11	10	00	01	11	10
B'	10	00	01	11	01	11	10	11
C'	01	11	10	00	10	00	01	00
D'	11	10	00	01	11	10	00	01