

Supprimental exercises for Hardware Design I Chap. 3

Computing Architecture Lab.
Hajime Shimada
E-mail: shimada@is.naist.jp

1

Short Exercise

- Show simplified logical expression of following logical function with Karnaugh map

x y z	f(x, y, z)
0 0 0	0
0 0 1	0
0 1 0	0
0 1 1	1
1 0 0	0
1 0 1	1
1 1 0	1
1 1 1	1

blue "1": covered by essential prime implecant

xy \ z	0	1
00	0	0
01	0	1
11	1	1
10	0	1

yz
xy
xz

$$f(x, y, z) = xy + xz + yz$$



Short Exercise

- Show simplified logical expression of following logical function with Karnaugh map

x y z	f(x, y, z)
0 0 0	1
0 0 1	0
0 1 0	1
0 1 1	1
1 0 0	0
1 0 1	1
1 1 0	1
1 1 1	1

blue "1": covered by essential prime implicant

xy \ z	0	1
00	1	0
01	1	1
11	1	1
10	0	1

$$f(x, y, z) = y + x'z' + xz$$



Computing Architecture Lab.
Hajime Shimada

Hardware Design I (Chap. 3)

3

Short Exercise

- Show simplified logical expression of following logical function with Karnaugh map

$$f(a,b,c,d) = b'c' + b'd' + a'cd + a'c'd'$$

ab \ cd	00	01	11	10
00	1	1	1	1
01	1	0	1	0
11	0	1	0	0
10	1	1	0	1

a b c d	f(a,b,c,d)
0 0 0 0	1
0 0 0 1	1
0 0 1 0	1
0 0 1 1	1
0 1 0 0	1
0 1 0 1	0
0 1 1 0	0
0 1 1 1	1
1 0 0 0	1
1 0 0 1	1
1 0 1 0	1
1 0 1 1	0
1 1 0 0	0
1 1 0 1	1
1 1 1 0	0
1 1 1 1	0



Computing Architecture Lab.
Hajime Shimada

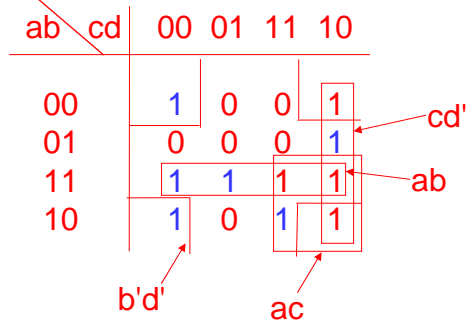
Hardware Design I (Chap. 3)

4

Short Exercise

- Show simplified logical expression of following logical function with Karnaugh map

$$f(a,b,c,d) = ab + ac + b'd' + cd'$$



a	b	c	d	f(a,b,c,d)
0	0	0	0	1
0	0	0	1	0
0	0	1	0	1
0	0	1	1	0
0	1	0	0	0
0	1	0	1	0
0	1	1	0	1
0	1	1	1	0
1	0	0	0	1
1	0	0	1	0
1	0	1	0	1
1	0	1	1	1
1	1	0	0	1
1	1	0	1	1
1	1	1	0	1
1	1	1	1	1



