

Homework #2

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1.

(a)

Input and espresso result ignore the don't-care

```
ouo@ouo-virtual-machine:~/文件$ nano BCD-to-seven.pla
```

```
GNU nano 6.2 BCD-to-seven.pla
.i 4
.o 2
.ilb A B C D
.ob e f
.p 16
0000 11
0001 00
0010 10
0011 00
0100 01
0101 01
0110 11
0111 00
1000 11
1001 01
1010 00
1011 00
1100 00
1101 00
1110 00
1111 00
```

```
ouo@ouo-virtual-machine:~/文件$ espresso BCD-to-seven.pla > output.pla
```

```
ouo@ouo-virtual-machine:~/文件$ nano output.pla
```

```
GNU nano 6.2 output.pla
.i 4
.o 2
.ilb A B C D
.ob e f
.p 5
01-0 01
0-10 10
100- 01
010- 01
-000 11
.e
```

Input and espresso result exploit the don't-care

```
ouo@ouo-virtual-machine:~/文件$ nano BCD-to-seven-DC.pla
```

```
GNU nano 6.2 BCD-to-seven-DC.pla
.i 4
.o 2
.ilb A B C D
.ob e f
.p 16
0000 11
0001 00
0010 10
0011 00
0100 01
0101 01
0110 11
0111 00
1000 11
1001 01
1010 --
1011 --
1100 --
1101 --
1110 --
1111 --
```

```
ouo@ouo-virtual-machine:~/文件$ espresso BCD-to-seven-DC.pla > output.pla
ouo@ouo-virtual-machine:~/文件$ nano output.pla
```

```
GNU nano 6.2 output.pla
.i 4
.o 2
.ilb A B C D
.ob e f
.p 5
-1-0 01
--10 10
-000 11
1--- 01
-10- 01
.e
```

(b)

可以，

e 的卡諾圖：

e	CD			
AB	00	01	11	10
00	1	0	0	1
01	0	0	0	1
11	-	-	-	-
10	1	0	-	-

簡化結果： $CD' + B'D'$

espresso: $CD' + B'C'D'$

f 的卡諾圖：

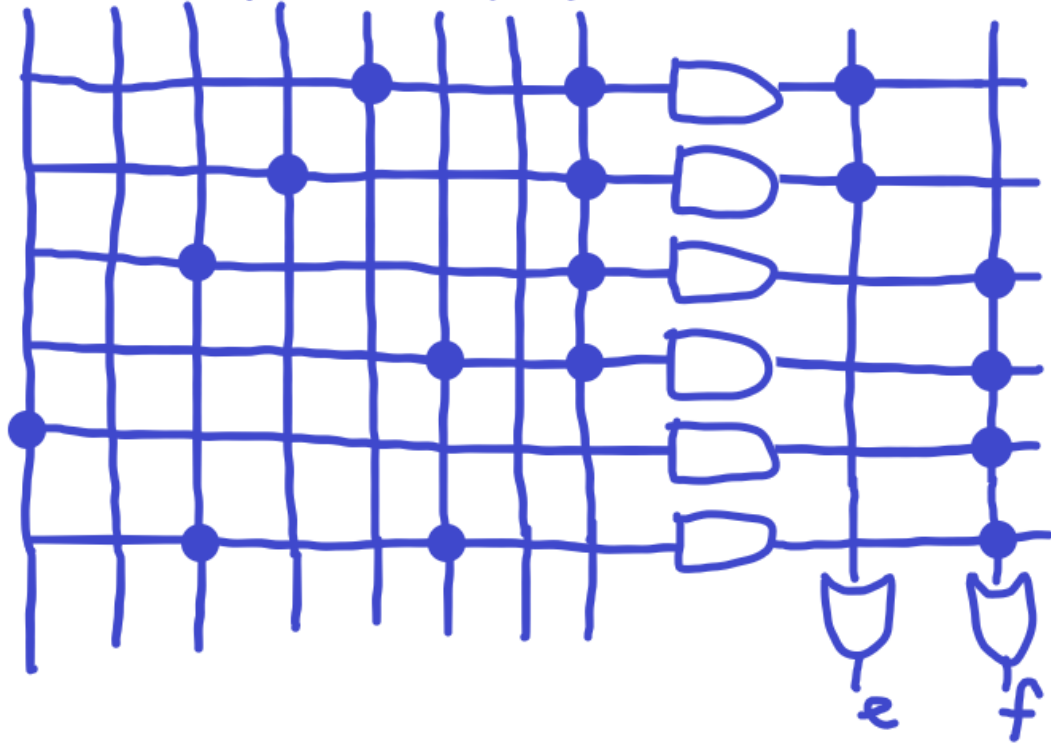
f	CD			
AB	00	01	11	10
00	1	0	0	0
01	1	1	0	1
11	X	X	X	X
10	1	1	X	X

簡化結果： $BD' + C'D' + A + BC'$

espresso: $BD' + B'C'D' + A + BC'$

(c)

$A A' B B' C C' D D'$



2.

(1) no option

```
ouo@ouo-virtual-machine:~/文件$ time espresso alu4.pla
.i 14
.o 8
.ilb i_0_ i_1_ i_2_ i_3_ i_4_ i_5_ i_6_ i_7_ i_8_ i_9_ i_10_ i_11_ i_12_ i_13_
.ob o_0_ o_1_ o_2_ o_3_ o_4_ o_5_ o_6_ o_7_
.p 575
10010101001100 00000001
10010010110010 00000001
01010011001100 00000001
01010100110010 00000001
00010001-11100 00000001

real    0m0.161s
user    0m0.149s
sys     0m0.010s
```

(2) QM algorithm

```
ouo@ouo-virtual-machine:~/文件$ time espresso -Dexact alu4.pla
.i 14
.o 8
.ilb i_0_ i_1_ i_2_ i_3_ i_4_ i_5_ i_6_ i_7_ i_8_ i_9_ i_10_ i_11_ i_12_ i_13_
.ob o_0_ o_1_ o_2_ o_3_ o_4_ o_5_ o_6_ o_7_
.p 575
10010101001100 00000001
10010010110010 00000001
01010011001100 00000001
01010100110010 00000001
00010001-11100 00000001
00010110-11010 00000001

real    0m1.367s
user    0m1.354s
sys     0m0.007s
```

Machine: Ubuntu 22.04.3 LTS (VMware)