$\{S_2, S_2, S_1, S_0\}$ 011 +3

100

\+ 1

101 -3

0111 +7

1000

\+ 1

1001

-8 + 1 = -7

10000

1----

!!!!

-16

3-bit

100 011

-4 +3

n-bit

$-2^{n-1} \rightarrow 2^{n-1} - 1$

001	1	P
010	2	P
0011	3	P

n p
+ n + p
p n
↓
overflow
s_2

c_2

100 −4 n
+ 111 −1 n
1 011 +3 = p
−8 $s_2 s_1 s_0$

−5

5

overflow
↓
use c_2

−4 + 3 = −1
111
−8 + 15 = −1
11111
11111 . . . 1

−1
11110
+ 1...111110
−2

n
× p
p
overflow
⊕

−2
+10
01 3 = +1
1001
−8 + 1 = −7

1111110
−2
...10 −2
0000001

1110 -2. n

1111 -1. n

1101 (-3) n

1000

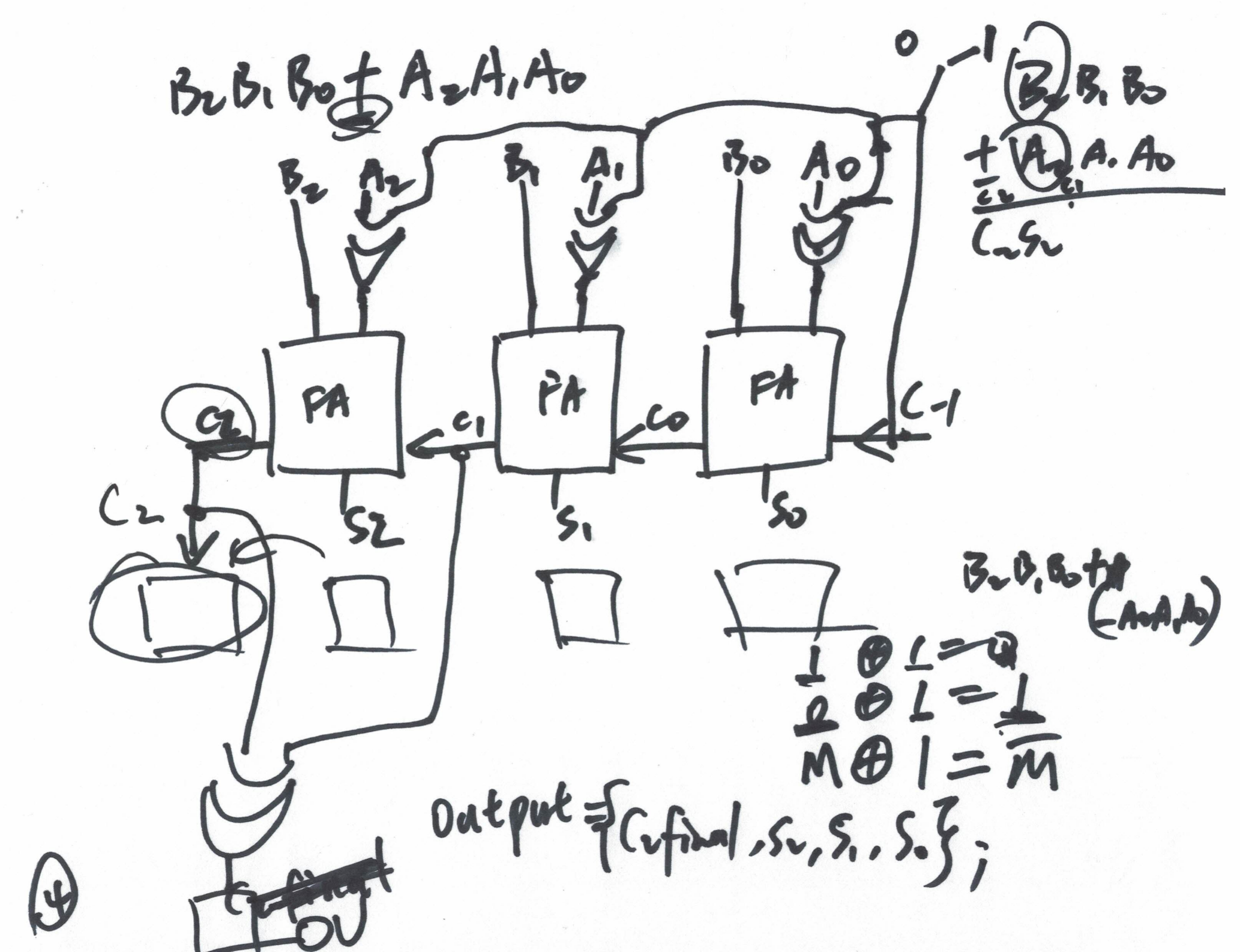
1000 n -8

1111 n -1

10111 +7 p -9

-16 +7 = (-9)

(3)


B2B1B0 ± A2A1A0
0
1
B2 B1 B0
± A2 A1 A0
C-1 S2
B2 A2
B1 A1
B0 A0
FA
FA
FA
C2
C1
C0
C-1
C2
S2
S1
S0
B2B1B0 加 (-A2A1A0)
1 ⊕ 1 = 0
0 ⊕ 1 = 1
M ⊕ 1 = M̄
Output = {Cofinal, S2, S1, S0};

C_2	S_2	A_2	B_2	C_1	OV	$C_{2\,final}$
0	0	0	0	0	0	0
0	1	0	0	1	1	0
0	1	0	1	0	0	1
0	1	0	1	1	0	0
1	0	1	0	0	0	1
1	0	1	0	1	0	0
1	0	1	1	0	1	1
1	1	1	1	1	0	1

$$OV = \bar{A}_2\bar{B}_2C_1 + A_2B_2\bar{C}_1$$

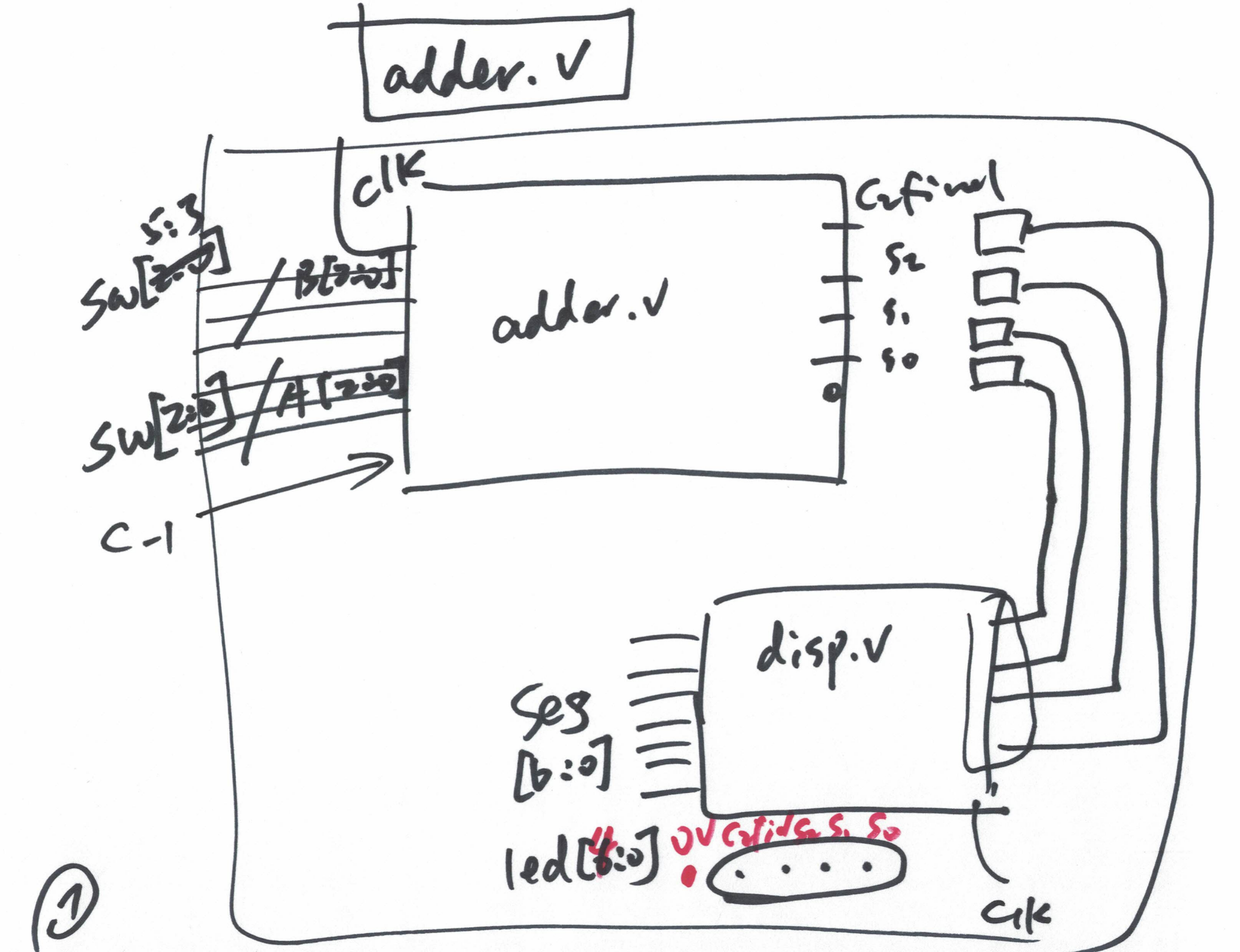
$$= C_1 \oplus C_2$$

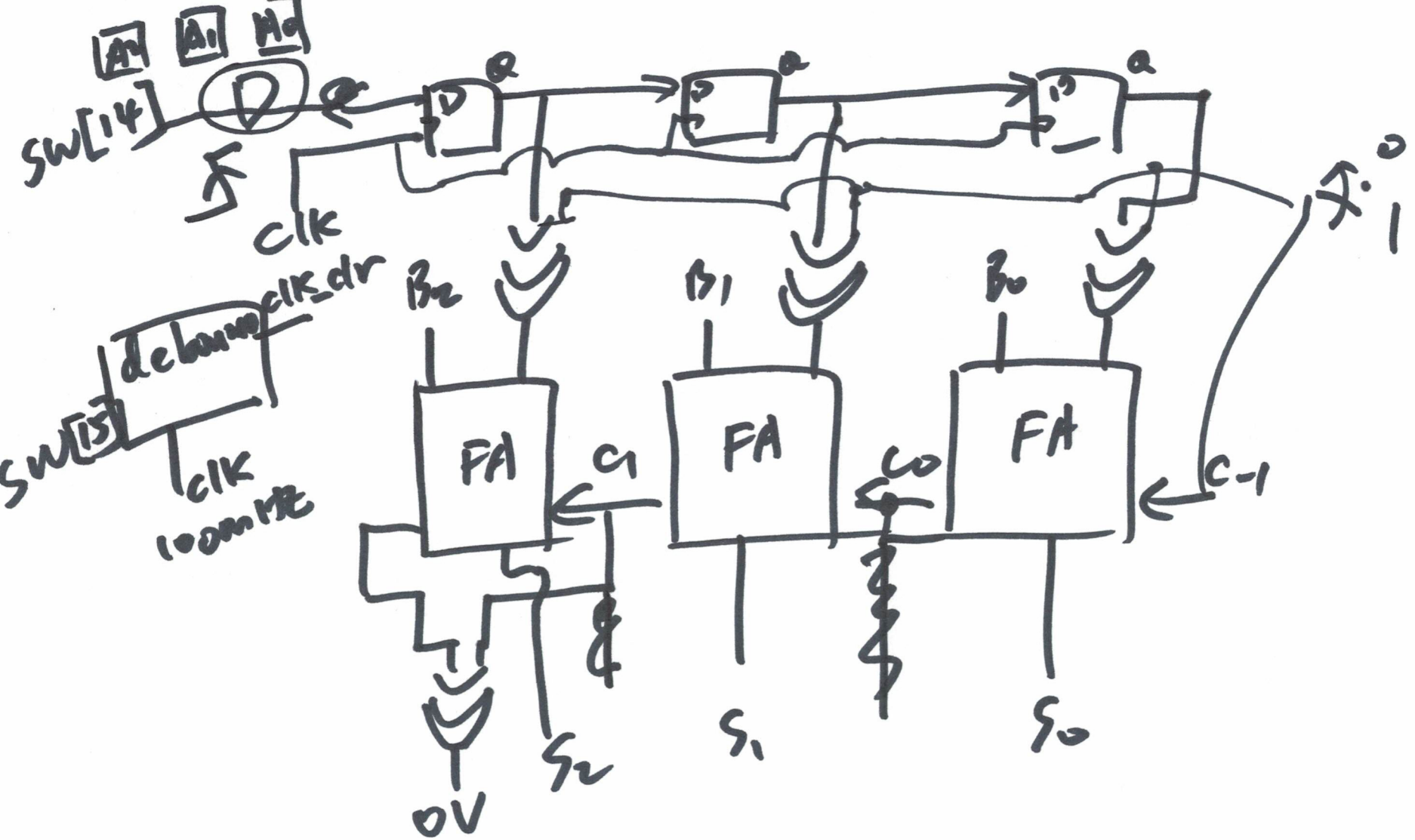
(5)

$$C_2 \text{final} = \bar{C}_2 S_2 \bar{O} \bar{U} + \bar{C}_2 S_2 \bar{O} U + C_2 S_2 O U + C_2 S_2 \bar{O} U$$

$$= C_2 \bar{S}_2 O U + (\bar{C}_2 + C_2) S_2 \bar{O} U$$

$$= C_2 \bar{S}_2 O U + S_2 \bar{O} U$$


adder.v
clk
adder.v
Cout[1]
S2
S1
S0
S:3
Sw[3:0]
B[3:0]
Sw[7:4]
A[3:0]
C-1
disp.v
seg
[6:0]
led[6:0]
0V cathode
clk



A2 A1 A0

1 | 1 | 0 | 1 | →

(8)