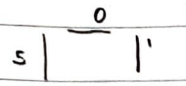
1)

HEx Display

	0	1	2	3	4	5	6
0	0	0	0	0	0	0	1
1	1	0	0	1	1	1	1
2	0	0	1	0	0	1	0
3	0	0	0	0	1	1	0
4	1	0	0	1	1	0	0
5	0	1	0	0	1	0	0
6	1	1	0	0	0	0	0
7	0	0	0	1	1	1	1
8	0	0	0	0	0	0	0
9	0	0	0	1	1	0	0

Lab 2

1)



Segments which will be turned off to show each number

0: 6
1: 0, 3, 4, 5, 6
2: 2, 5
3: 4, 5
4: 0, 3, 4
5: 1, 4
6: 0, 1
7: 3, 4, 5, 6
8:
9: 3, 4

	x_3	x_2	x_1	x_0
0	0	0	0	0
1	0	0	0	1
2	0	0	1	0
3	0	0	1	1
4	0	1	0	0
5	0	1	0	1
6	0	1	1	0
7	0	1	1	1
8	1	0	0	0
9	1	0	0	1

HEX(0):

x_1x_0 \ x_3x_2	00	01	11	10
00		1		
01	1			
11				
10				1

$\bar{x}_3 x_2 \bar{x}_0 + \bar{x}_3 \bar{x}_2 \bar{x}_1 x_0$

HEX(1):

x_1x_0 \ x_3x_2	00	01	11	10
00				
01		1		
11				
10		1		

$\bar{x}_3 x_2 (\bar{x}_1 x_0 + x_1 \bar{x}_0)$

HEX(2): $\bar{x}_3 \bar{x}_2 x_1 \bar{x}_0$

HEX(3):

x_1x_0 \ x_3x_2	00	01	11	10
00	0	1	D	0
01	1	0	D	1
11	0	1	D	D
10	0	0	D	D

$x_2 \bar{x}_1 \bar{x}_0 + \bar{x}_2 \bar{x}_1 x_0 + x_2 x_1 \bar{x}_0 + \bar{x}_1 (x_2 \bar{x}_0 + \bar{x}_2 x_0) +$

HEX(4):

x_1x_0 \ x_3x_2	00	01	11	10
00	0	1	D	0
01	1	1	D	1
11	1	1	D	D
10	0	0	D	D

$$\bar{x}_3 x_0 + x_2 \bar{x}_1 + x_3 x_0$$

HEX(5):

x_1x_0 \ x_3x_2	00	01	11	10
00	0	0	D	0
01	1	0	D	0
11	1	1	D	D
10	1	0	D	D

$$\bar{x}_3 \bar{x}_2 x_0 + \bar{x}_3 \bar{x}_2 x_1 + \bar{x}_3 x_1 x_0$$

HEX(6):

x_1x_0 \ x_3x_2	00	01	11	10
00	1	0	D	0
01	1	0	D	0
11	0	1	D	D
10	0	0	D	D

$$\bar{x}_3 \bar{x}_2 \bar{x}_1 + x_2 x_1 x_0$$

2)

	V_3 V_2 V_1 V_0
8	1000
9	1001
10	1010
11	1011
12	1100
13	1101
14	1110
15	1111

$$Z = V_3 (V_2 + V_1)$$

V_3	V_2	V_1	V_0
0	0	0	0
0	0	0	1
0	0	1	0
0	0	1	1
0	1	0	0
0	1	0	1

$a_0 = V_0$

$a_1 = \bar{V}_1$

$a_2 = V_2 V_1$

4)

	C_0	S_3	S_2	S_1	S_0	Mux
0	0	0	0	0	0	
1	0	0	0	0	1	
2	0	0	0	1	0	
3	0	0	0	1	1	
4	0	0	1	0	0	
5	0	0	1	0	1	
6	0	0	1	1	0	
7	0	0	1	1	1	
8	0	1	0	0	0	
9	0	1	0	0	1	
10	0	1	0	1	0	
11	0	1	0	1	1	
12	0	1	1	0	0	
13	0	1	1	0	1	
14	0	1	1	1	0	
15	0	1	1	1	1	
16	1	0	0	0	0	
17	1	0	0	0	1	
18	1	0	0	1	0	
19	1	0	0	1	1	

S_3 S_2 S_1 S_0
0 0 0 0
0 0 0 1
0 0 1 0
0 0 1 1
0 1 0 0
0 1 0 1
0 1 1 0
0 1 1 1
1 0 0 0
1 0 0 1

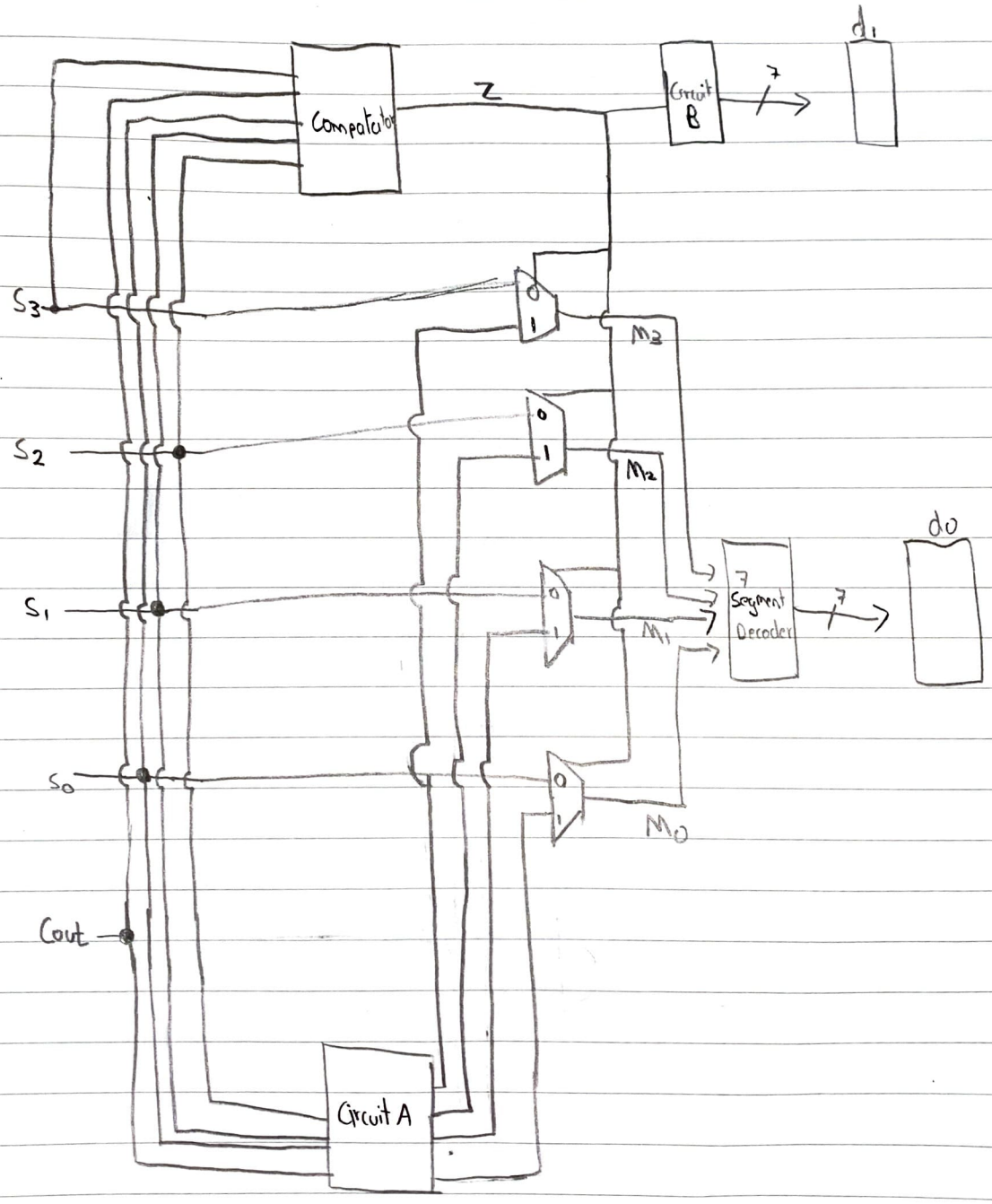
$$Z = S_3 (S_2 + S_1) \text{ OR } C_0$$

$$A_0 = S_0$$

$$A_1 = \overline{S_1}$$

$$A_2 = S_2 S_1 + C_0 \overline{S_1}$$

$$A_3 = C_{out} S_1$$


Comparator
Z
Circuit B
7
d1
S3
S2
S1
S0
Cout
M3
M2
M1
M0
7 Segment Decoder
7
d0
Circuit A