

(a) Design a 2-bit logic circuit.

$$\begin{array}{r} \text{Hint: } \begin{array}{r} A_1 \ A_0 \\ + \ B_1 \ B_0 \\ \hline C_1 \ S_1 \ S_0 \end{array} \end{array}$$

$A_1$	$A_0$	$B_1$	$B_0$	$S_1$	$S_0$	$C_1$
0	0	0	0	0	0	0
0	0	0	1	0	1	0
0	0	1	0	1	0	0
0	0	1	1	1	1	0
0	1	0	0	1	1	0
0	1	0	1	0	0	1
0	1	1	0	0	1	1
0	1	1	1	0	0	1
1	0	0	0	1	1	0
1	0	0	1	0	0	1
1	0	1	0	0	1	1
1	0	1	1	0	0	1
1	1	0	0	0	1	1
1	1	0	1	1	0	1
1	1	1	0	1	0	1
1	1	1	1	1	1	1

A<sub>1</sub>  
0  
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A<sub>0</sub>  
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B<sub>1</sub>  
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B<sub>0</sub>  
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S<sub>1</sub>  
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S<sub>0</sub>  
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0  
1

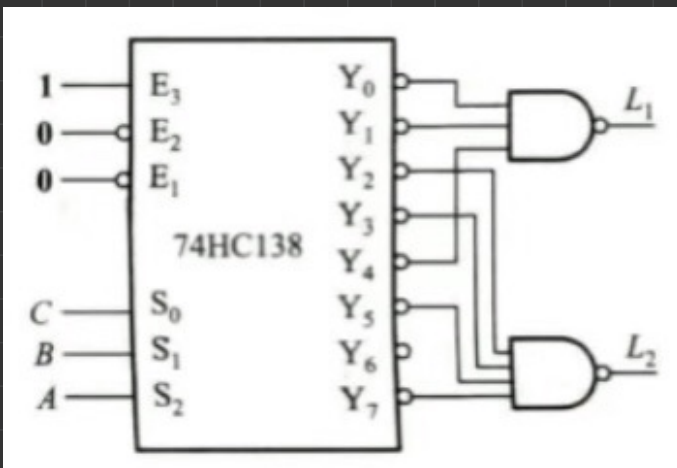
C<sub>1</sub>  
0  
0  
0  
0  
0  
0  
0  
0  
1  
0  
1  
0  
1  
0  
1  
0  
1

A<sub>1</sub>A<sub>0</sub> / B<sub>1</sub>B<sub>0</sub>

	00	01	11	10
00		1	1	
01		1		1
11	1		1	
10	1	1		

$$S_1 = \overline{A_1} \overline{B_1} \overline{B_0} + \overline{A_1} \overline{A_0} \overline{B_1} + \overline{A_1} \overline{A_0} B_0 + \overline{A_1} \overline{B_1} B_0 + A_1 A_0 B_1 B_0 + \overline{A_1} A_0 B_1 \overline{B_0}$$

1b)



$$L_1 = \overline{Y_0} \cdot \overline{Y_1} \cdot \overline{Y_4} = Y_0 + Y_1 + Y_4$$

$$= \overline{A} \overline{B} \overline{C} + \overline{A} B \overline{C} + A \overline{B} \overline{C}$$

$$= \overline{B} \overline{C} + \overline{A} \overline{B}$$

AB \ C		0	1
0	0	0	1
0	1	0	0
1	1	0	0
1	0	1	0

$$L_2 = \overline{Y_2} \cdot \overline{Y_3} \cdot \overline{Y_5} \cdot \overline{Y_6} = m_2 + m_3 + m_5 + m_7$$

$$= \overline{A} \overline{B} \overline{C} + \overline{A} B \overline{C} + A \overline{B} \overline{C} + A B \overline{C}$$

AB \ C		0	1
0	0	0	0
0	1	1	0
1	1	0	0
1	0	1	0

$$L_2 = \overline{A} B + A \overline{B}$$

16) Use 74HC138 to design.

$$F = \bar{A}\bar{B}\bar{C} + A\bar{B}\bar{C} + AB\bar{C} + ABC$$

$$=$$

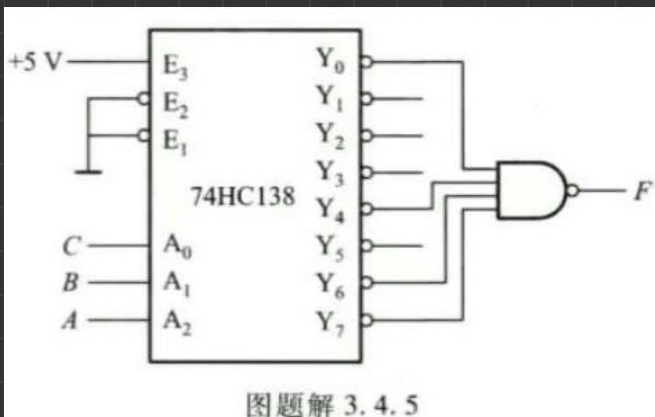
$$\bar{A}\bar{B}\bar{C} + A\bar{B}\bar{C} + AB\bar{C} + ABC$$

$$=$$

$$\overline{\bar{A}\bar{B}\bar{C}} \cdot \overline{A\bar{B}\bar{C}} \cdot \overline{AB\bar{C}} \cdot \overline{ABC}$$

$$=$$

$$\bar{Y}_0 \cdot \bar{Y}_4 \cdot \bar{Y}_6 \cdot \bar{Y}_7$$

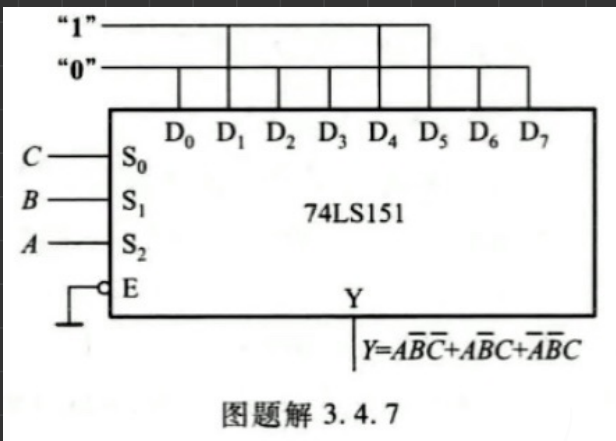


图题解 3.4.5

(d) Use 74LS151 design  $Y = \overline{A}\overline{B}C + A\overline{B}C + \overline{A}BC$

$$Y^1 = \sum_{i=0}^7 m_i D_i = m_0 D_0 + m_1 D_1 + \dots + m_7 D_7$$

$$= \overline{A}\overline{B}C \cdot D_4 + A\overline{B}C \cdot D_5 + \overline{A}BC \cdot D_1$$



(e) Design a half subtractor

A	B	D	V
0	0	0	0
0	1	1	1
1	0	1	0
1	1	0	0

$$D = \overline{A}B + A\overline{B} = A \oplus B$$

$$V = A\overline{B}$$

