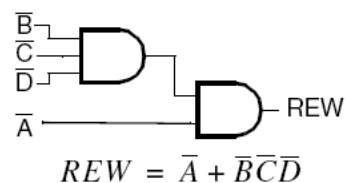
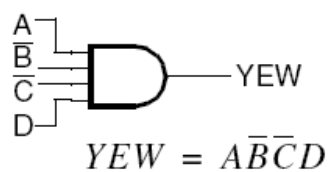
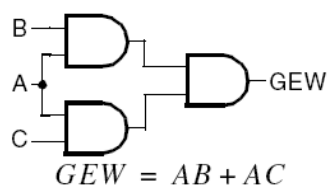
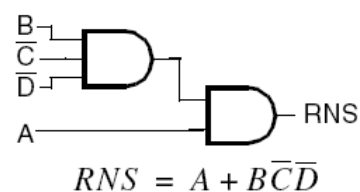
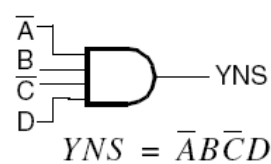
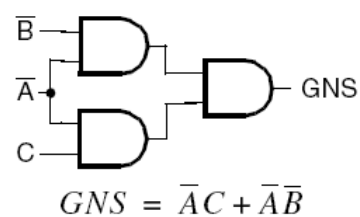


### 第三章布置习题参考解

3-7

ABCD	GNS	YNS	RNS	GEW	YEW	REW
0000	1	0	0	0	0	1
0001	1	0	0	0	0	1
0011	1	0	0	0	0	1
0010	1	0	0	0	0	1
0110	1	0	0	0	0	1
0111	1	0	0	0	0	1
0101	0	1	0	0	0	1
0100	0	0	1	0	0	1
1100	0	0	1	1	0	0
1101	0	0	1	1	0	0
1111	0	0	1	1	0	0
1110	0	0	1	1	0	0
1010	0	0	1	1	0	0
1011	0	0	1	1	0	0
1001	0	0	1	0	1	0
1000	0	0	1	0	0	1



3-8

A	B	C	S5	S4	S3	S2	S1	S0
0	0	0	0	0	0	0	0	0
0	0	1	0	0	0	0	0	1
0	1	0	0	0	0	1	0	0
0	1	1	0	0	1	0	0	1
1	0	0	0	1	0	0	0	0
1	0	1	0	1	1	0	0	1
1	1	0	1	0	0	1	0	0
1	1	1	1	1	0	0	0	1

$$S0 = C$$

$$S1 = 0$$

$$S2 = B\bar{C}$$

$$S3 = \bar{A}BC + A\bar{B}C$$

$$S4 = A\bar{B} + AC$$

$$S5 = AB$$

### 3-11

(a)

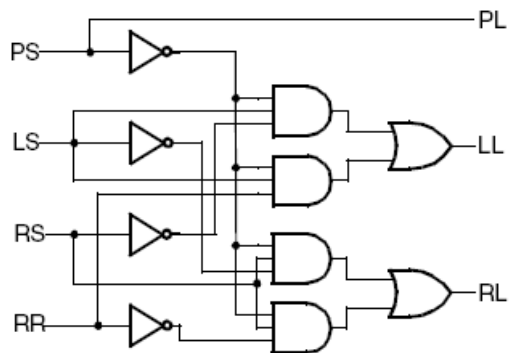
PS	LS	RS	RR	PL	LL	RL
0	0	0	0	0	0	0
0	0	0	1	0	0	0
0	0	1	0	0	0	1
0	0	1	1	0	0	1
0	1	0	0	0	1	0
0	1	0	1	0	1	0
0	1	1	0	0	0	1
0	1	1	1	0	1	0
1	0	0	0	1	0	0
1	0	0	1	1	0	0
1	0	1	0	1	0	0
1	0	1	1	1	0	0
1	1	0	0	1	0	0
1	1	0	1	1	0	0
1	1	1	0	1	0	0
1	1	1	1	1	0	0

$$PL = PS$$

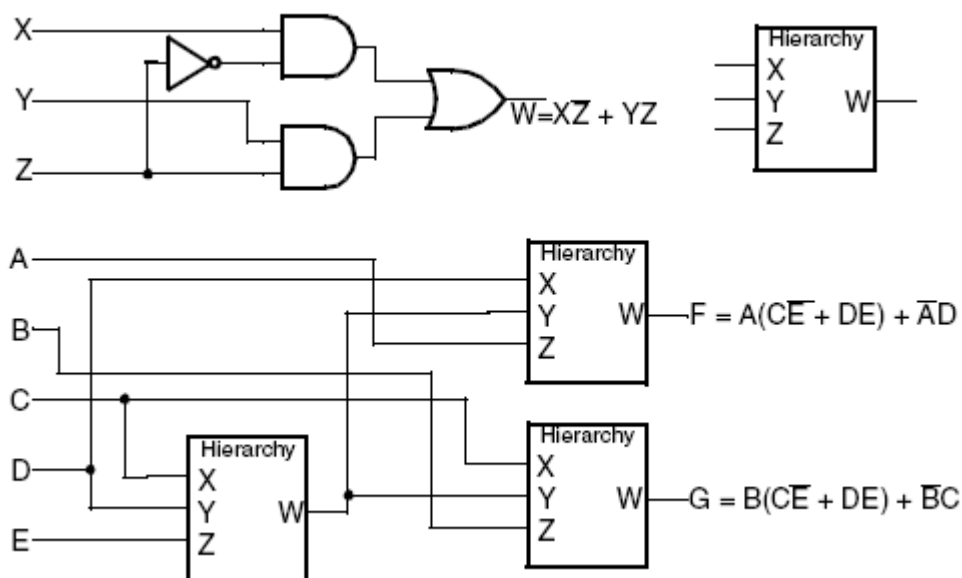
$$LL = \overline{PS} LS \overline{RS} + \overline{PS} LS RR$$

$$RL = \overline{PS} \overline{LS} RS + \overline{PS} RS \overline{RR}$$

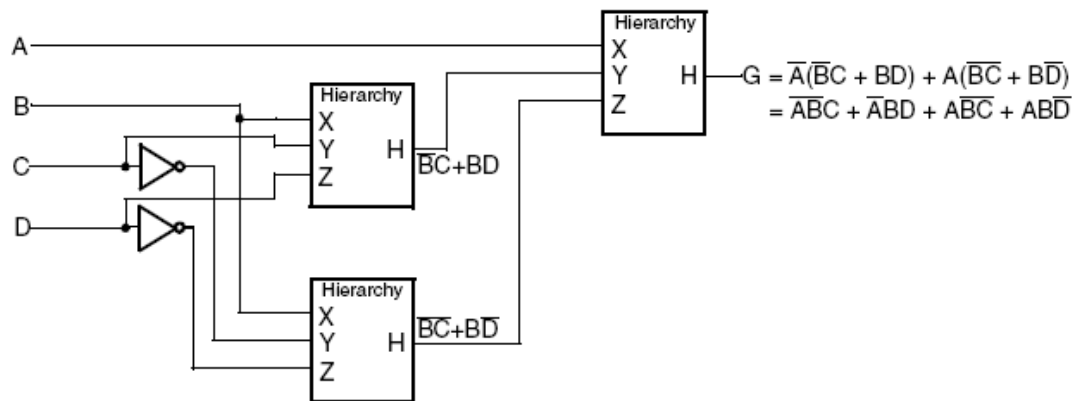
(b)



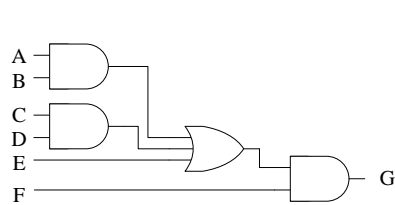
3-13 一个电路实现下面一对布尔方程：



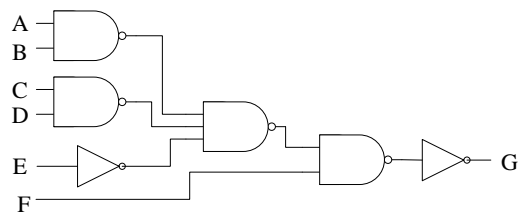
### 3-14



### 3-16



Original circuit



Solution

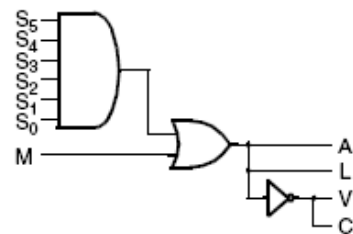
### 3-27

$$A = (S_0 \cdot S_1 \cdot S_2 \cdot S_3 \cdot S_4 \cdot S_5) + M$$

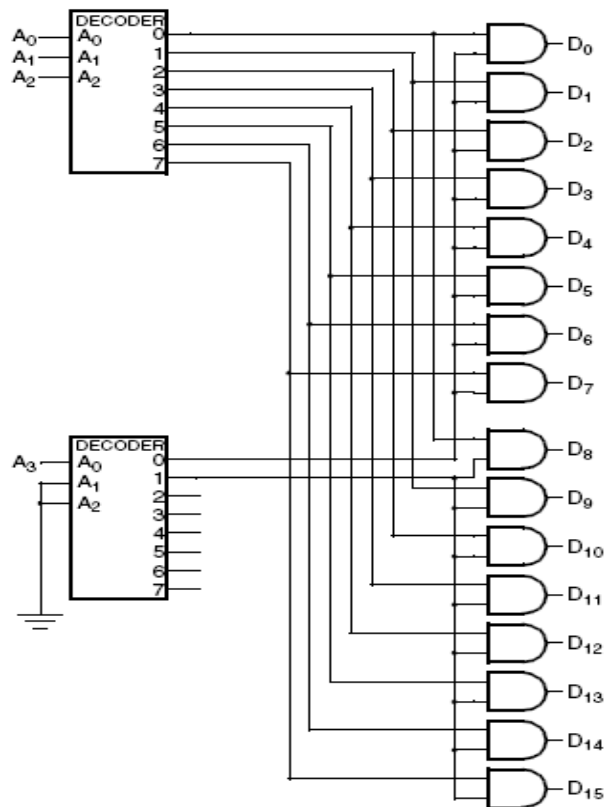
$$L = A$$

$$V = \overline{A} = \overline{(S_0 \cdot S_1 \cdot S_2 \cdot S_3 \cdot S_4 \cdot S_5) + M}$$

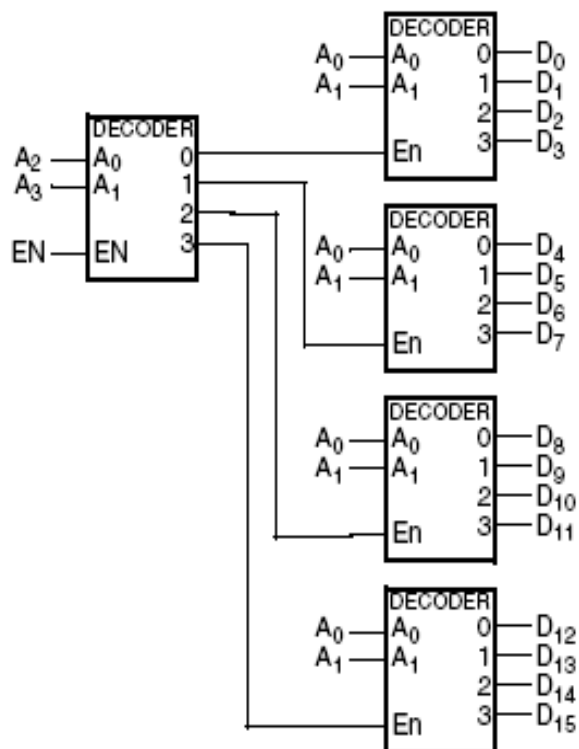
$$C = V$$



### 3-28

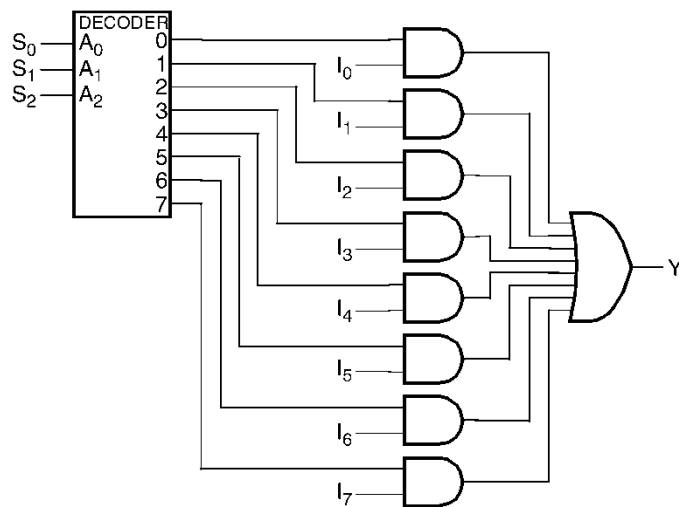


3-29

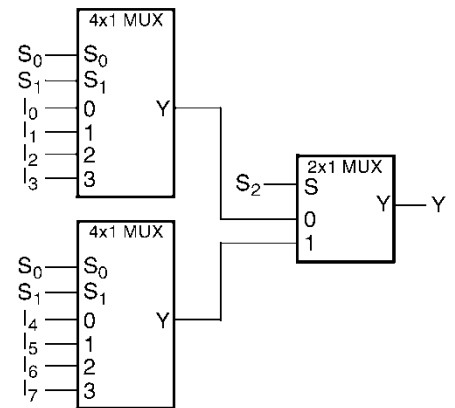


### 3-37

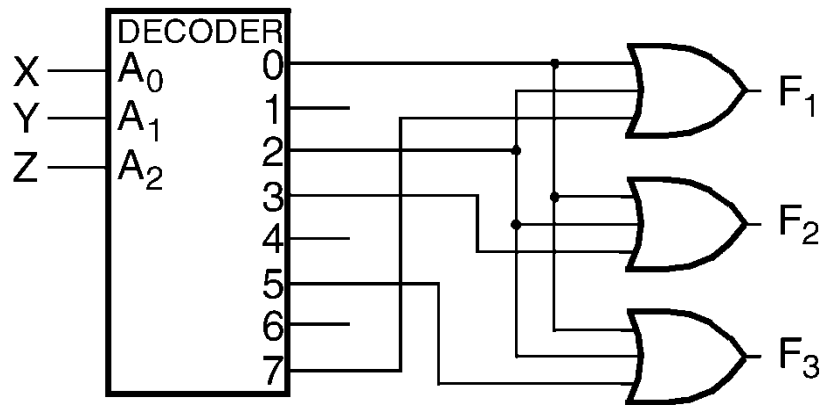
a)



b)



### 3-44



### 3-47

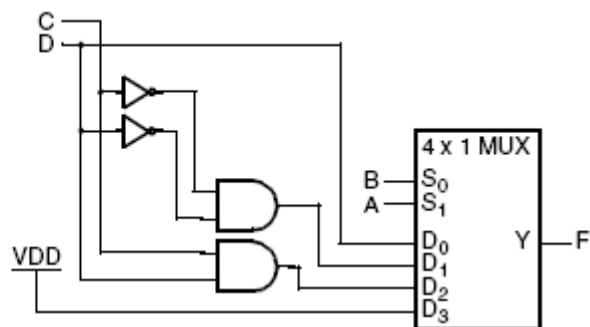
A	B	C	D	F
0	0	0	0	0
0	0	0	1	1
0	0	1	0	0
0	0	1	1	1
0	1	0	0	1
0	1	0	1	0
0	1	1	0	0
0	1	1	1	0
1	0	0	0	0
1	0	0	1	0
1	0	1	0	0
1	0	1	1	1
1	1	0	0	1
1	1	0	1	1
1	1	1	0	1
1	1	1	1	1

$$F=D$$

$$F=\overline{C} \overline{D}$$

$$F=C D$$

$$F=1$$



**3-50** 图 3-58 给出了四位加法器最低位运算的逻辑图。这与集成电路 74283 内部的实现相同。试验证该电路的全加器功能。

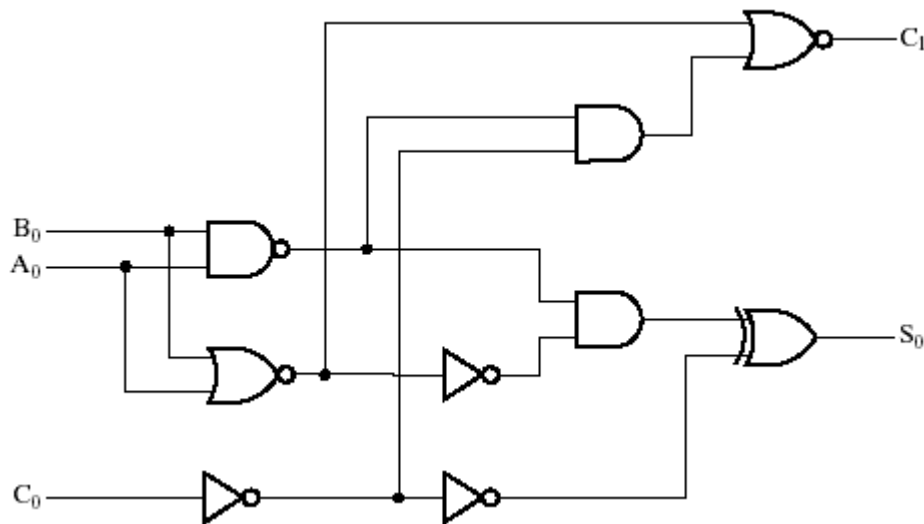
解：

$$C_1 = \overline{T_3 + T_2} = \overline{T_1 \bar{C}_0 + T_2} = \overline{\bar{A}_0 \bar{B}_0 \bar{C}_0 + \bar{A}_0 + B_0} = \overline{(\bar{A}_0 + \bar{B}_0) \bar{C}_0 + \bar{A}_0 \bar{B}_0} = (A_0 B_0 + C_0)(A_0 + B_0)$$

$$C_1 = A_0 B_0 + A_0 C_0 + B_0 C_0$$

$$S_0 = C_0 \oplus T_4 = C_0 \oplus T_1 \bar{T}_2 = C_0 \oplus \bar{A}_0 \bar{B}_0 (A_0 + B_0) = C_0 \oplus (\bar{A}_0 + \bar{B}_0)(A_0 + B_0) = C_0 \oplus A_0 \bar{B}_0 + \bar{A}_0 B_0$$

$$S_0 = A_0 \oplus B_0 \oplus C_0$$



**3-51** 求下列无符号二进制数的反码和补码：10011100，10011101，10101000，00000000 和 10000000。

Unsigned	1001 1100	1001 1101	1010 1000	0000 0000	1000 0000
1's Complement	0110 0011	0110 0010	0101 0111	1111 1111	0111 1111
2's Complement	0110 0100	0110 0011	0101 1000	0000 0000	1000 0000

**3-52** 求下列无符号二进制数相减的结果，其中减数采用二进制补码表示：

(a) 11010 - 10001      (b) 11110 - 1110      (c) 1111110 - 1111110      (d) 101001 - 101

a)    11010 +    01111 ----- 01001	b)    11110 +    10010 ----- 10000	c)    1111110 +    0000010 ----- 0000000	d)    101001 +    111011 ----- 100100
---------------------------------------------	---------------------------------------------	---------------------------------------------------	------------------------------------------------

**3-59** 设计一个组合电路来比较两个 4 位二进制数 A、B，判断 B 是否大于 A，这个电路输出为 X，满足：当 A<B 时，X=1；当 A≥B 时，X=0。

解：

1 位比较器：

输入		Zi	Yi	Wi
Ai	Bi	Ai> Bi	Ai= Bi	Ai< Bi
0	0	0	1	0
0	1	0	0	1
1	0	1	0	0
1	1	0	1	0

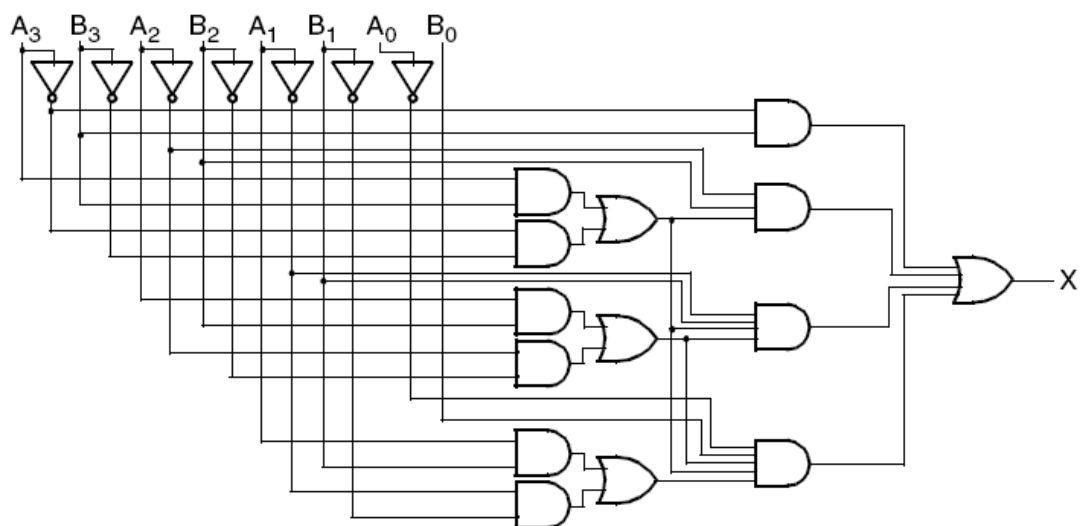
$$\begin{aligned}
 A_i > B_i \quad Z_i &= A_i \bar{B}_i \\
 A_i = B_i \quad Y_i &= \overline{A_i \bar{B}_i + B_i \bar{A}_i} \\
 A_i < B_i \quad W_i &= B_i \bar{A}_i
 \end{aligned}$$

4 位处理时从最高位开始逐位比较：

如果  $A < B$ ,  $(\bar{A}B=1)$  且所有  $j>i, A_j=B_j$   $(\bar{A}_j \bar{B}_j + A_j B_j=1)$ , 则  $A < B$ 。

A3<B3	A3=B3 且 A2<B2	A3=B3, A2=B2 且 A1<B1	A3=B3, A2=B2, A1=B1 且 A0<B0	X
1	X	X	X	1
	1	X	X	1
		1	X	1
			1	1
				0

$$\begin{aligned}
 X = & \bar{A}_3 B_3 + (A_3 B_3 + \bar{A}_3 \bar{B}_3) \bar{A}_2 B_2 + (A_3 B_3 + \bar{A}_3 \bar{B}_3) (A_2 B_2 + \bar{A}_2 \bar{B}_2) \bar{A}_1 B_1 \\
 & + (A_3 B_3 + \bar{A}_3 \bar{B}_3) (A_2 B_2 + \bar{A}_2 \bar{B}_2) (A_1 B_1 + \bar{A}_1 \bar{B}_1) \bar{A}_0 B_0
 \end{aligned}$$



解法二：用串行加法器构造电路 A-B，即在 B 上加非门，C<sub>0</sub> 接 1，在 C<sub>4</sub> 上加非门作为 X。

解法三：用串行加法器构造电路 B-A-1，即在 A 上加非门，C<sub>0</sub> 接 0，将 C<sub>4</sub> 作为 X。