

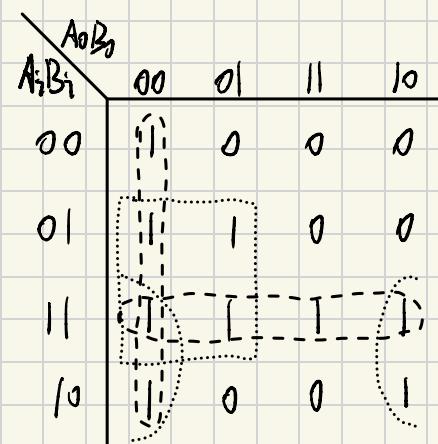
大作业(3)

设输血的两位为 $A_0 B_0$, 受血的两位为 $A_i B_i$
则根据现有条件得到真值表

A_0	B_0	A_i	B_i	F
0	0	0	0	1
0	0	0	1	1
0	0	1	0	1
0	0	1	1	1
0	1	0	0	0
0	1	0	1	1
0	1	1	0	0
0	1	1	1	1
1	0	0	0	0
1	0	0	1	0
1	0	1	0	1
1	0	1	1	1
1	1	0	0	0
1	1	0	1	0
1	1	1	0	0
1	1	1	1	1

$$F = \sum m(0, 1, 2, 3, 5, 7, 10, 11, 15)$$

卡诺图如下



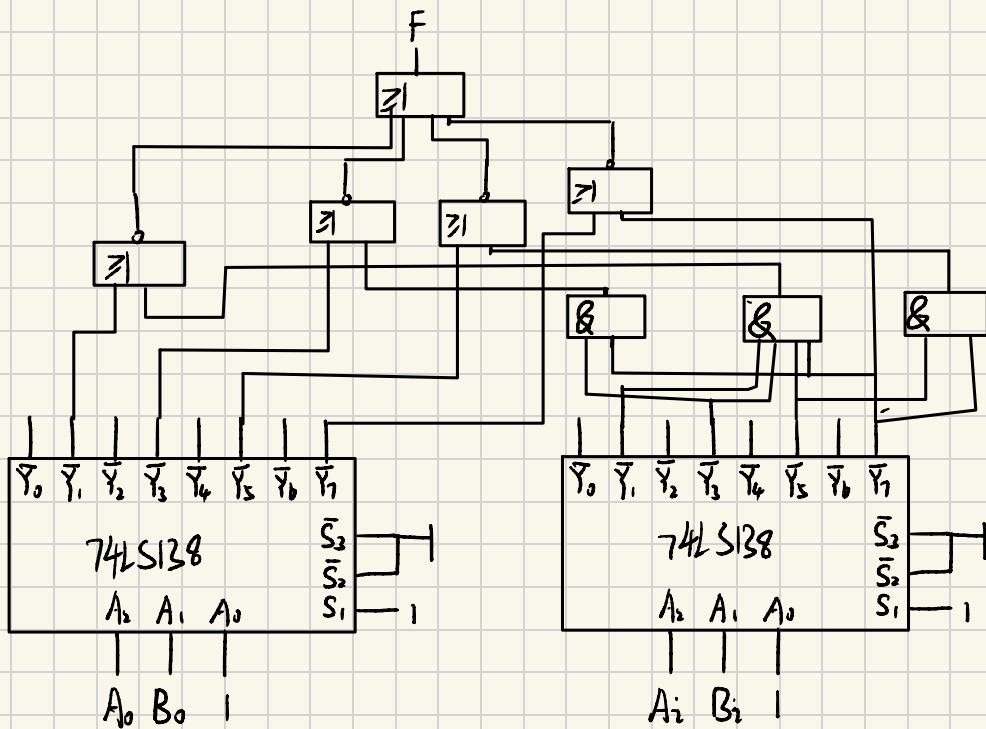
根据卡诺图

$$\begin{aligned} F &= \overline{A_0} \overline{B_0} + A_i B_i + \overline{A_0} B_i + \overline{B_0} A_i \\ &= \overline{A_0} \overline{B_0} \cdot \overline{A_i} B_i \cdot \overline{A_0} B_i \cdot \overline{B_0} A_i \end{aligned}$$

① 使用74138

需要使用两片74138芯片

设 00 为 O型血 01 为 B型血 10 为 A型血、11 为 AB型血

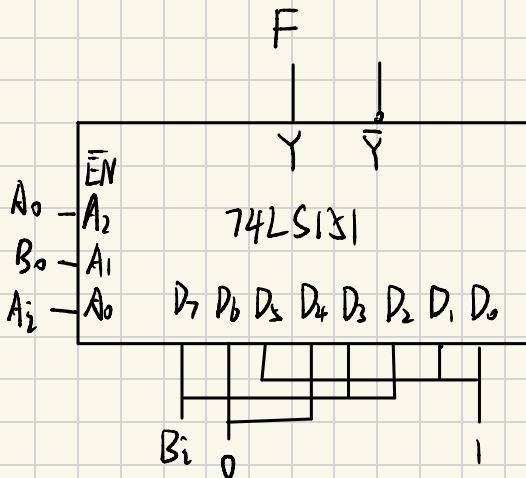


输入	Y	血型
00	1	O
01	3	B
10	5	A
11	7	AB

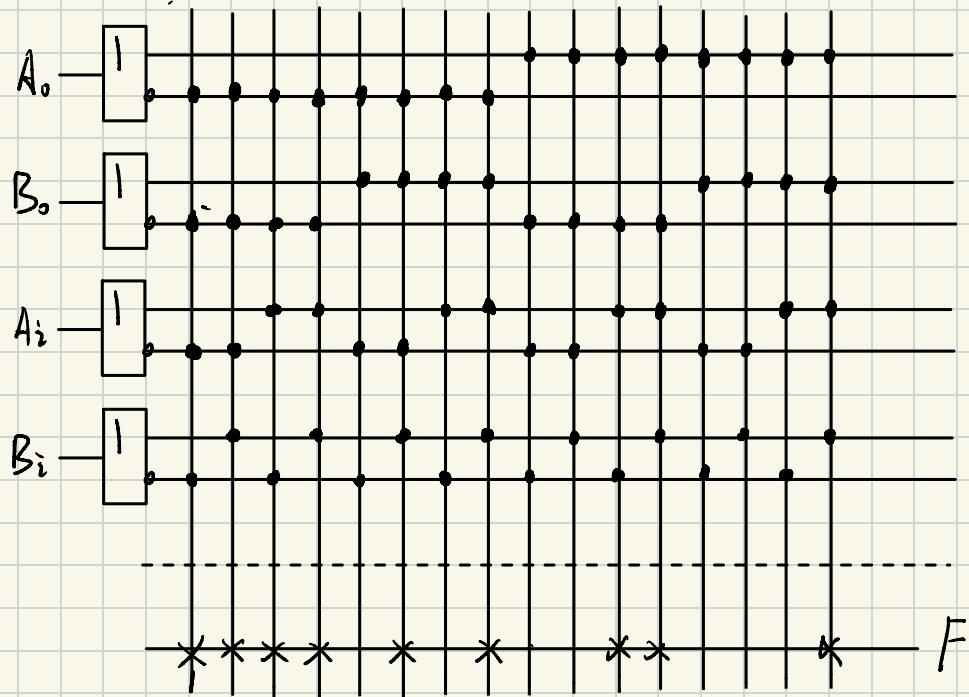
② 使用74151芯片

$$F = \sum_m (0, 1, 2, 3, 5, 7, 10, 11, 15)$$

$$\begin{aligned} F &= \bar{A}_0 \bar{B}_0 \bar{A}_i \bar{B}_i + \bar{A}_0 \bar{B}_0 \bar{A}_i B_i + \bar{A}_0 B_0 A_i \bar{B}_i + \bar{A}_0 B_0 A_i B_i \\ &\quad + \bar{A}_0 B_0 \bar{A}_i B_i + \bar{A}_0 B_0 A_i B_i + A_0 \bar{B}_0 A_i \bar{B}_i + A_0 \bar{B}_0 A_i B_i + A_0 B_0 A_i B_i \\ &= \bar{A}_0 \bar{B}_0 \bar{A}_i (\bar{B}_i + B_i) + \bar{A}_0 \bar{B}_0 A_i (\bar{B}_i + B_i) + \bar{A}_0 B_0 \bar{A}_i B_i \\ &\quad + \bar{A}_0 B_0 A_i B_i + A_0 \bar{B}_0 A_i (\bar{B}_i + B_i) + A_0 B_0 A_i B_i \\ &= \bar{A}_0 \bar{B}_0 \bar{A}_i \cdot 1 + \bar{A}_0 \bar{B}_0 A_i \cdot 1 + \bar{A}_0 B_0 \bar{A}_i B_i + \bar{A}_0 B_0 A_i B_i \\ &\quad + A_0 \bar{B}_0 A_i \cdot 1 + A_0 B_0 A_i \cdot B_i \end{aligned}$$



③ 使用 PROM $F = \sum_m (0, 1, 2, 3, 5, 7, 10, 11, 15)$



④ 使用 PLA

$$F = \bar{A}_0 \bar{B}_0 + A_i B_i + \bar{A}_0 B_2 + \bar{B}_0 A_i$$

