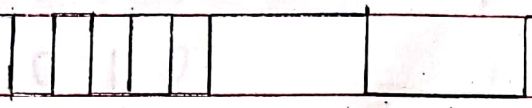
崔浩然
2020302181062
数逻

武漢大學
WUHAN UNIVERSITY
Wuhan 430072, Hubei, P.R.China 中国·武汉 Tel.(027)

习题三

3.8

Y_1:



Y_2:

习题四

4.3 该电路将8421码转为格雷码，下为真值表

$W=A$，$X=A\oplus B$，$Y=B\oplus C$，$Z=C\oplus D$

A	B	C	D	W	X	Y	Z
0	0	0	0	0	0	0	0
0	0	0	1	0	0	0	1
0	0	1	0	0	0	1	1
0	0	1	1	0	0	1	0
0	1	0	0	0	1	1	0
0	1	0	1	0	1	1	1
0	1	1	0	0	1	0	1
0	1	1	1	0	1	0	0
1	0	0	0	1	1	0	0
1	0	0	1	1	1	0	1
1	0	1	0	1	1	1	1
1	0	1	1	1	1	1	0
1	1	0	0	1	0	1	0
1	1	0	1	1	0	1	1
1	1	1	0	1	0	0	1
1	1	1	1	1	0	0	0

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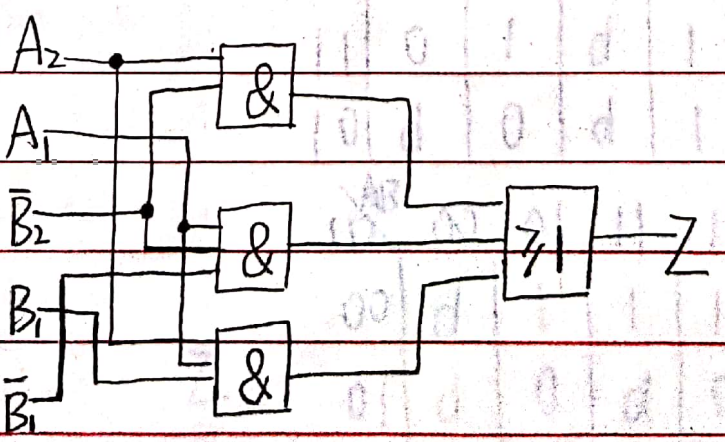
4.4

A_2	A_1	B_2	B_1	Z
0	0	0	0	0
0	0	0	1	0
0	0	1	0	0
0	0	1	1	0
0	1	0	0	1
0	1	0	1	0
0	1	1	0	0
0	1	1	1	0
1	0	0	0	1
1	0	0	1	1
1	0	1	0	0
1	0	1	1	0
1	1	0	0	1
1	1	0	1	1
1	1	1	0	1
1	1	1	1	0

B_2B_1 \ A_2A_1	00	01	11	10
00	0	1	1	1
01	0	0	1	1
11	0	0	0	0
10	0	0	1	0

$\therefore F(A_2, A_1, B_2, B_1) = A_2\bar{B}_2 + A_1\bar{B}_2\bar{B}_1 + A_2A_1B_1$



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4.5 设余3码用A,B,C,D表示，2421码用WXYZ表示。

A	B	C	D	W	X	Y	Z
0	0	0	0	d	d	d	d
0	0	0	1	d	d	d	d
0	0	1	0	d	d	d	d
0	0	1	1	0	0	0	0
0	1	0	0	0	0	0	1
0	1	0	1	0	0	1	0
0	1	1	0	0	0	1	1
0	1	1	1	0	1	0	0
1	0	0	0	0	1	1	1
1	0	0	1	1	0	0	0
1	0	1	0	1	0	0	1
1	0	1	1	1	0	1	0
1	1	0	0	1	0	1	1
1	1	0	1	d	d	d	d
1	1	1	0	d	d	d	d
1	1	1	1	d	d	d	d

W:

CD \ AB	00	01	11	10
00	d	0	1	1
01	d	0	d	1
11	0	0	d	1
10	d	0	d	1

X:

CD \ AB	00	01	11	10
00	d	0	1	0
01	d	0	d	1
11	0	1	d	1
10	d	0	d	1

Y:

CD \ AB	00	01	11	10
00	d	0	1	1
01	d	1	d	0
11	0	0	d	1
10	d	1	d	0

Z:

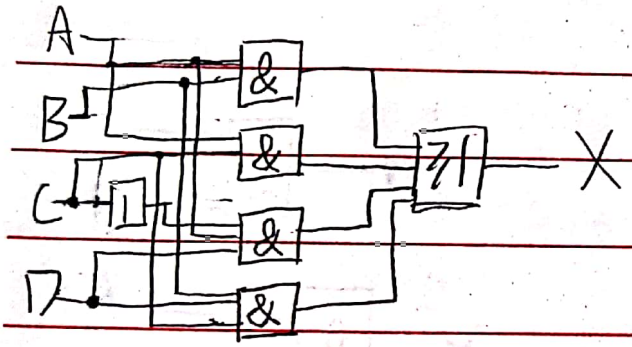
CD \ AB	00	01	11	10
00	d	1	1	1
01	d	0	d	0
11	0	0	d	0
10	d	1	d	0

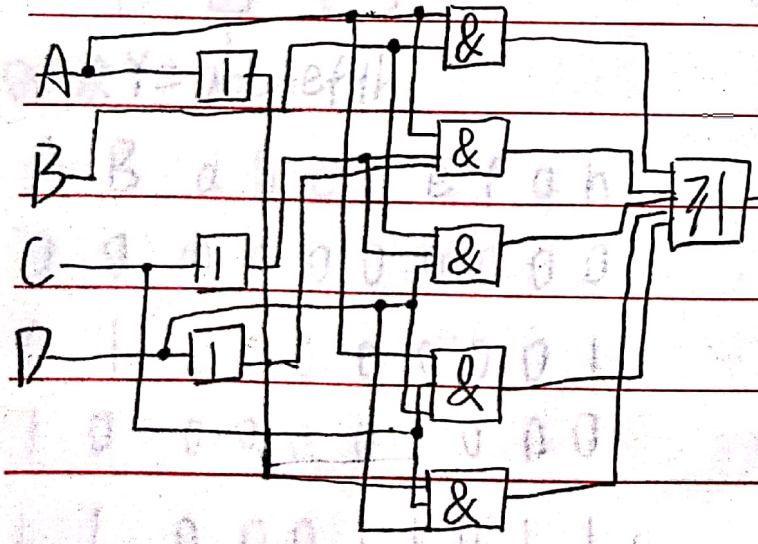
由卡诺图可得：$W=A$，$X=AB+AC+A\bar{C}D+B\bar{C}D$

$Y=AB+A\bar{C}\bar{D}+B\bar{C}D+ACD+\bar{A}C\bar{D}$

$Z=\bar{C}\bar{D}+C\bar{D}=\bar{D}$

A —— W





D —— 1 —— Z

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(1) 设 Y=WXYZ

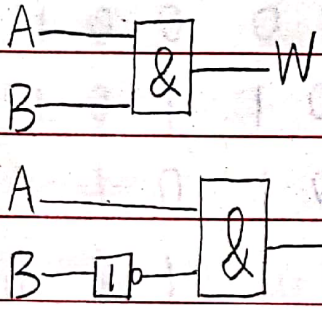
A	B	W	X	Y	Z
0	0	0	0	0	0
0	1	0	0	0	1
1	0	0	1	0	0
1	1	1	0	0	1

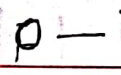
∴ $W=m_3=AB$

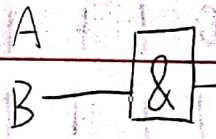
$X=m_2=A\bar{B}$

~~Z~~ $Y=0$

$Z=m_1+m_3=\bar{A}B+AB=B$







(2) 设 Y=abcdefgh

A	B	a	b	c	d	e	f	g	h
0	0	0	0	0	0	0	0	0	0
0	1	0	0	0	0	0	0	0	1
1	0	0	0	0	0	1	0	0	0
1	1	0	0	0	1	1	0	1	1

∴ $a=0$, $b=0$, $c=0$

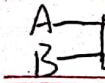
$d=m_3=AB$

$e=A\bar{B}+\bar{A}B=m_2+m_3=A$

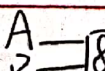
$f=0$, $g=m_3=AB$

$h=m_1+m_3=\overline{\overline{AB}}+AB=B$

0-a, 0-b, 0-c, 0-f



A-e



B-h

4.10 设A为被加/被减数，B为加/减数，C为来自低位的进位输入/借位输入

~~结果为X~~ X为向高位的进位/向高位的借位，Y为本位和/差

M	A	B	C	X	Y
0	0	0	0	0	0
0	0	0	1	0	1
0	0	1	0	0	1
0	0	1	1	1	0
0	1	0	0	0	1
0	1	0	1	1	0
0	1	1	0	1	0
0	1	1	1	1	1

M	A	B	C	X	Y
1	0	0	0	0	0
1	0	0	1	1	1
1	0	1	0	1	0
1	0	1	1	1	0
1	1	0	0	0	1
1	1	0	1	0	0
1	1	1	0	0	0
1	1	1	1	1	1

M=0: $X(A,B,C)=\sum m(3,5,6,7)$　　M=1: $X(A,B,C)=\sum m(1,2,3,7)$

$Y(A,B,C)=\sum m(1,2,4,7)$　　$Y(A,B,C)=\sum m(1,2,4,7)$

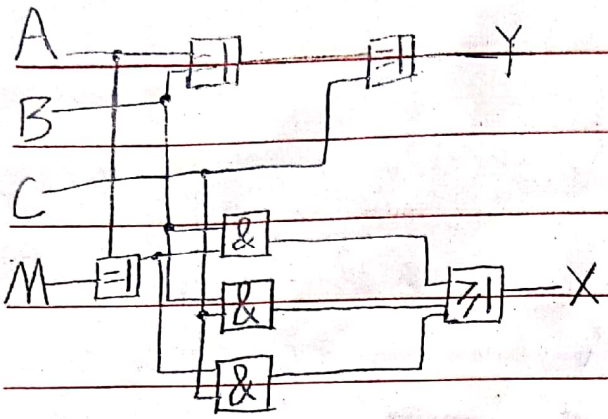
M=0: $X=\bar{A}BC+A\bar{B}C+AB\bar{C}+ABC=AB+AC+BC$

$Y=\bar{A}\bar{B}C+\bar{A}B\bar{C}+A\bar{B}\bar{C}+ABC=(\bar{A}B+A\bar{B})C+(\bar{A}B+A\bar{B})\bar{C}$ 过

$=\overline{(\bar{A}B+A\bar{B})}C+(\bar{A}B+A\bar{B})\bar{C}=A\oplus B\oplus C$

M=1 $X=BC+\bar{A}B+\bar{A}C$

$Y=A\oplus B\oplus C$



4.12

(1) $F_1 = AB + A\bar{C} + \bar{C}D$ ，存在发生竞争

(2) $F_2 = AB + \bar{A}CD + \bar{B}C$ ，A 具备竞争条件

BCD=000，$F_2=0$　　BCD=100，$F_2=\bar{A}$

BCD=001，$F_2=0$　　BCD=101，$F_2=A$

BCD=010，$F_2=0$　　BCD=110，$F_2=A+1$

BCD=011，$F_2=\bar{A}$　　BCD=111，$F_2=A+\bar{A}$

~~当BCD取值111时，可能产生险象~~ 存在发生险象

(3) $F_3=(A+B)(\bar{A}+C)=A\bar{C}+\bar{A}B+BC$ ，A具备竞争条件

BC=00，$F_3=1$　　BC=10，$F_3=A$

BC=01，$F_3=\bar{A}$　　BC=11，$F_3=A\cdot\bar{A}$

存在险象，当BC取值11时

~~$F_3=(A+B)(\bar{A}+C)$~~　$F_3=(A+B)(\bar{A}+C)(B+C)$