梁桐 2023370018 计算机科学与技术

2.2 证明

$(x+y)\cdot(x+\bar{y})$

$= x\cdot(x+\bar{y}) + y(x+\bar{y})$

$= x\cdot x + x\cdot\bar{y} + y\cdot x + y\cdot\bar{y}$

$= x + x\cdot\bar{y} + x\cdot y + 0$

$= x + x(\bar{y}+y)$

$= x + x$

$= x$ $\quad\therefore\ (x+y)(x+\bar{y}) = x$

2.10 证明:

$\sum m(1,2,3,4,5,6,7) = \bar{x}_1\bar{x}_2x_3 + \bar{x}_1x_2\bar{x}_3 + \bar{x}_1x_2x_3 + x_1\bar{x}_2\bar{x}_3$
$\quad + x_1\bar{x}_2x_3 + x_1x_2\bar{x}_3 + x_1x_2x_3$

$= \bar{x}_1(\bar{x}_2x_3 + x_2\bar{x}_3 + x_2x_3) + x_1(\bar{x}_2\bar{x}_3 + \bar{x}_2x_3 + x_2\bar{x}_3 + x_2x_3)$

$= \bar{x}_1(\bar{x}_2x_3 + x_2(\bar{x}_3+x_3)) + x_1(\bar{x}_2(\bar{x}_3+x_3) + x_2(\bar{x}_3+x_3))$

$= \bar{x}_1(\bar{x}_2x_3 + x_2) + x_1(\bar{x}_2 + x_2)$

$= \bar{x}_1(x_2+x_3) + x_1$

$= x_1 + \bar{x}_1(x_2+x_3)$

$= x_1 + x_2 + x_3$

$\therefore\ \sum m(1,2,3,4,5,6,7) = x_1+x_2+x_3$

2.13 解: $f = x_1\bar{x}_2\bar{x}_3 + x_1x_2x_4 + x_1\bar{x}_2x_3\bar{x}_4$

$= x_1\bar{x}_2(\bar{x}_3 + x_3\bar{x}_4) + x_1x_2x_4$

$= x_1\bar{x}_2(\bar{x}_3+x_3)(x_3+\bar{x}_4) + x_1x_2x_4$

$= x_1\bar{x}_2x_3 + x_1\bar{x}_2\bar{x}_4 + x_1x_2x_4$

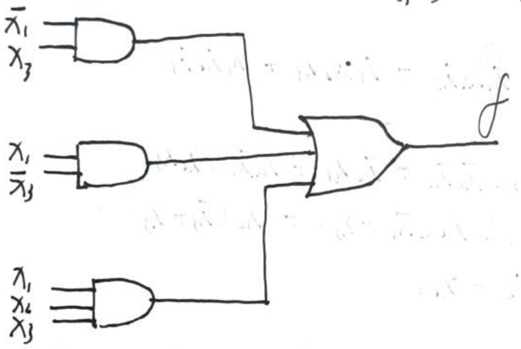
2.21

解: $f(x_1x_2x_3) = \bar{x}_1\bar{x}_2x_3 + \bar{x}_1x_2x_3 + x_1\bar{x}_2\bar{x}_3 + x_1x_2\bar{x}_3 + x_1x_2x_3$

卡诺图:

x_3 \ x_1x_2	00	01	11	10
0	0	0	1	1
1	1	1	1	0

$f(x_1x_2x_3) = \bar{x}_1x_3 + x_1\bar{x}_3 + x_1x_2x_3$



2.24 解: 卡诺图如下.

x_3x_4 \ x_1x_2	00	01	11	10
00	0	0	1	1
01	0	1	1	1
11	0	0	0	0
10	0	0	0	0

最简积之和表达式:

$f(x_1,x_2,x_3,x_4) = x_1\bar{x}_3 + \bar{x}_1x_2\bar{x}_3x_4$

3.2 (a). 0111011110

原码: 0111011110

$(478)_{10}$

(b). 1011100111

原码: 1100011000

$(-280)_{10}$

(c). 1111111110

原码: 1000000001

$(-1)_{10}$

3.7 解：

(a). 0111011110

原码：0111011110

$(478)_{10}$

(b). 1011100111

原码：1100011001

$(-281)_{10}$

(c). 1111111110

原码：1000000010

$(-2)_{10}$

3.8.

证：设负数为 k

则其2的补码

$$k_2 = 2^n - B$$

可令 B 为 $b_{n-1}\ b_{n-2}\ \cdots\ b_k\ b_{k-1}\ \cdots\ b_0$

$2^n = A + C$ 则有下图

B	b_{n-1}	b_{n-2}	$\cdots$	b_k	b_{k-1}	$\cdots$	b_0
A	1	1	$\cdots$	1	0	$\cdots$	0
+							
C	0	0	$\cdots$	1	0	$\cdots$	0

$$k_i = \begin{cases} 0 & i < k \\ 1 & i = k \\ \overline{b_i} & i > k \end{cases}$$

由上可证得题目正确

3.10 证：构建k位加法器

$$C_k = C_{k-1} \cdot S_k + S_{k-1} \cdot (X_k \oplus y_k)$$

$k=1$ 时成立

此时 $C_k = C_0$

当 $k = m$ 时

$C_m = x_m \oplus y_m \oplus S_m$ 成立 则

$k = m+1$ 时

$$S_{m+1} = C_m$$

$$C_{m+1} = (x_m \cdot y_m) + S_m(x_m \oplus y_m)$$

$$C_{m+1} = C(m+1)(x_{k+1} \oplus y_{k+1})C_{m+1} \cdot S_{k+1}$$

$$= x_m \oplus y_m \oplus S_m \oplus C_{k+1} \oplus y_{k+1} \oplus S_m$$

$$C_k = x_k \oplus y_k \oplus S_k$$