1.20 求下列函数的最小项标准式和最大项标准式。

(1) $F=\overline{(AB+ABD)}(B+CD)$

(2) $F=(\bar{A}+C)(A+B)(C+\bar{D})$

(3) $F=(\bar{A}\oplus B)(A\oplus\bar{B})+B\oplus C\oplus D$

$\bar{A}\bar{B}=\overline{AB}$

(1) $F=(\bar{A}\bar{B}\ \ \overline{A\bar{B}D})(B+CD)$

$=(\bar{A}+\bar{B})(\bar{A}+\bar{B}+\bar{D})(B+CD)$

$=(\bar{A}+\bar{B}+\bar{A}\bar{B}+\bar{A}\bar{D}+\bar{B}\bar{D})(B+CD)$

$=\bar{A}B+\bar{A}B\bar{D}+\bar{A}CD+\bar{B}CD+\bar{A}\bar{B}CD$

$=\bar{A}B(C\bar{D}+\bar{C}D+CD+CD)+\bar{A}(B+\bar{B})CD$

$+(A+\bar{A})\underset{B}{\bar{B}}CD+\bar{A}\bar{B}CD.$

$=\sum m^4(\ \ 3,4,5,6,7,11)$

$F=\bar{A}\bar{B}CD+\bar{A}B\bar{C}D+\bar{A}BC\bar{D}+\bar{A}BCD$

$+\bar{A}BCD+\bar{A}\bar{B}CD$

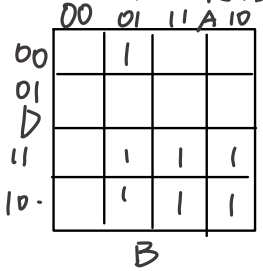
$=\overline{\bar{A}\bar{B}CD}\cdot\overline{\bar{A}B\bar{C}D}\ \overline{\bar{A}BC\bar{D}}\cdot\overline{\bar{A}BCD}\ \overline{\bar{A}BCD}$

$\overline{\bar{A}B(D)}$

$=\prod M^4(1,2,8,9,10,12,13,14,15)$

(2) $F=(\bar{A}\bar{B}+AC+BC)(C+\bar{D})$

$=(\bar{A}\bar{B}C+AC+BC+\bar{A}B\bar{D}+AC\bar{D}+BC\bar{D})$



$\therefore F=\sum m^4(4,6,7,10,11,14,15)$

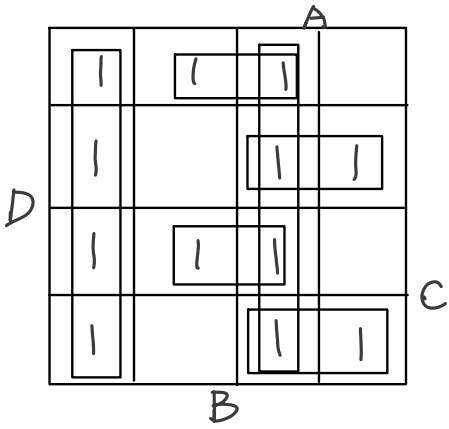
$\therefore\prod M^4(1,2,3,5,8,9,12,13)$

(3) $F=(\bar{A}\oplus B)(A\oplus\bar{B})+B\oplus C\oplus D$ 有一定技巧

$F=(\bar{A}\bar{B}+AB)(AB+\bar{A}\bar{B})+(\bar{B}C+B\bar{C})\oplus D$

$AB+\bar{A}\bar{B}+\overline{\bar{B}C}\cdot D+B\bar{C}\bar{D}$

$AB+\bar{A}\bar{B}+(B+\bar{C})D+B\bar{C}\bar{D}$ 作卡诺图



$$F = \sum m^4(0,1,2,3,4,7,9,10,12,13,14,15)$$

$$= \prod M^4(5,6,8,11)$$

1.22 用卡诺图化简下列各式为最简与或式及最简或与式。

(1) $F=\prod m^4(1,4,5,6,7,9,14,15)$

(2) $F=\prod M^3(0,1,3,4,5)$

(3) $F=\sum m^4(1,4,5,7,12,14,15)$

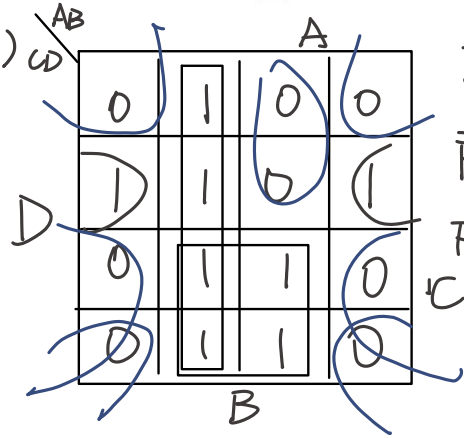
(4) $F=\prod M^4(1,7,9,13,15)+d(2,4,12)$

补充：用卡诺图化简如下带无关项的逻辑函数为最简与或式及最简或与式。

(1) $F(A,B,C,D)=\sum m(4,5,7,8,13,15)+\sum d(0,1,6,12)$

(2) $F(A,B,C,D)=\sum m(1,3,5,7,9,10)+\sum d(11,12,13,14,15)$

(1)



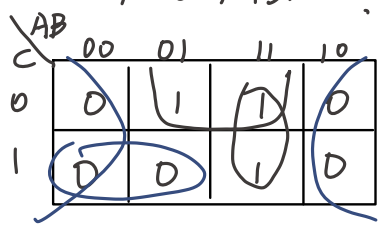
$F=BC+\bar{A}B+\bar{B}\bar{C}D$

$\bar{F}=\bar{B}\bar{D}+\bar{B}C+AB\bar{C}$

$F=(B+D)(B+\bar{C})(\bar{A}+\bar{B}+C)$

可以画12张. 清楚一点 圈画对了 表达式出问题 可以酌情给.

(2) $\prod M^3(0,1,3,4,5)=\sum m^3(2,6,7)$

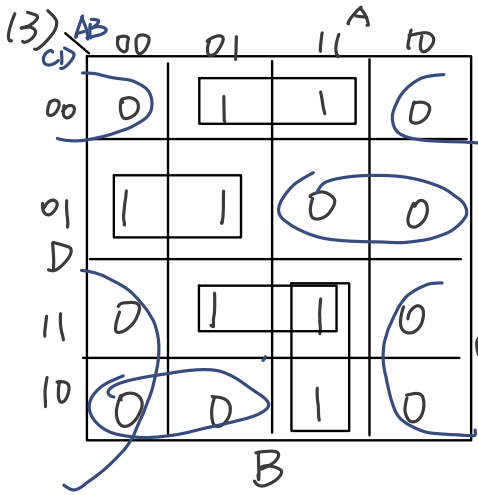


与或 $F=AB+B\bar{C}$

或与 $\bar{F}_1=\bar{B}+\bar{A}C$

$F_1=B(A+\bar{C})$

(3)



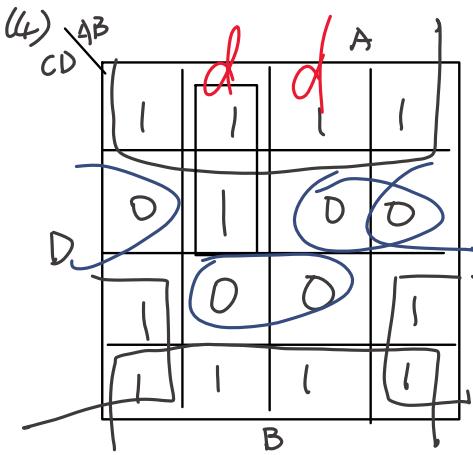
$F_1 = B\bar{C}\bar{D} + \bar{A}\bar{C}D + BCD + ABC$

$\bar{F}_2 = B\bar{C} + \bar{B}\bar{C}\bar{D} + A\bar{C}D + \bar{A}C\bar{D}$

与或式

$\therefore F_2 = (\bar{B}+C)(B+C+D)(\bar{A}+C+\bar{D})(A+\bar{C}+D)$

(4)



d：可当1可当0 怎么来

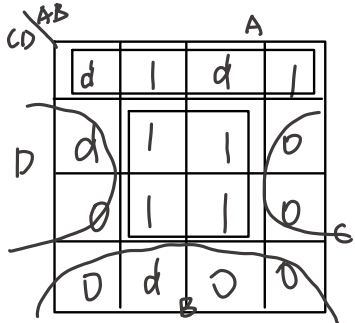
$F = \bar{D} + \bar{B}C + \bar{A}B\bar{C}$

$\bar{F} = \bar{B}\bar{C}D + A\bar{C}D + BCD$

$\therefore F = (B+C+\bar{D})(\bar{A}+C+\bar{D})$

变成0 这里会有d (1时d被1覆盖了) $(\bar{B}+\bar{C}+\bar{D})$

补充(1) $F = \Sigma m(4,5,7,8,13,15) + \Sigma d(0,1,6,12)$

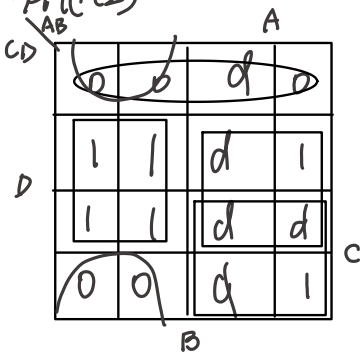


$F = \bar{C}\bar{D} + BD$ (与或)

$\bar{F} = \bar{B}D + C\bar{D}$

$F = \overline{\bar{B}D} \cdot \overline{C\bar{D}} = (B+\bar{D})(\bar{C}+D)$ (或与)

补充(2)



$F = \bar{A}D + AD + AC$ (与或)

$\bar{F} = \bar{C}\bar{D} + \bar{A}\bar{D}$

$\therefore F = \overline{\bar{C}\bar{D}} \cdot \overline{\bar{A}\bar{D}} = (C+D)(A+D)$ (或与)