

模拟电路与数字电路

第八章 作业答案

8.7 写出下列二进制数的原码、反码和补码

题号	二进制数	原码	反码	补码
1	+1011	01011	01011	01011
2	+011001	0011001	0011001	0011001
3	-1101	11101	10010	10011
4	-001101	1001101	1110010	1110011

8.8 写出下列带符号二进制数的反码和补码

题号	原码	反码	补码
1	001011	001011	001011
2	011011	011011	011011
3	101011	110100	110101
4	111011	100100	100101

8.9 用 8 位二进制补码表示下列十进制数

题号	十进制数	原码	补码
1	+19	0001 0011	0001 0011
2	+43	0010 1011	0010 1011
3	-17	1001 0001	1110 1111
4	-79	1100 1111	1011 0001
5	-115	1111 0011	1000 1101
6	-125	1111 1101	1000 0011

8.10 计算下列用补码表示的二进制数的代数和。如何和为负数，求出其绝对值。

题号	内容
1	0010 0110+0100 1101=0111 0011
2	0100 1101+0010 1101=0111 1010
3	0011 0010+1000 0011=1011 0101, 0100 1011
4	1101 1101+0100 1011=1 0010 1000, 0010 1000
5	1101 1011+1110 0111=1 1100 0010, 0011 1110
6	1000 1000+1111 1001=1 1000 0001, 0111 1111

8.12 写出下列逻辑函数的对偶式 F' 与反函数 \bar{F} 。

- $F = \bar{A}\bar{B} + CD, F = (\bar{A} + \bar{B})(C + D), \bar{F} = (A + B)(\bar{C} + \bar{D})$
- $F = [(A\bar{B} + C)D + E]G, F' = ((A + \bar{B}) \cdot C + D) \cdot E + G, \bar{F} = ((\bar{A} + B) \cdot \bar{C} + \bar{D})\bar{E} + \bar{G}$
- $F = \overline{A\bar{B} + C + A + \bar{B}\bar{C}}, F' = (\bar{A} + \bar{B})\bar{C} \cdot A(\bar{B} + \bar{C}), \bar{F} = (\bar{A} + B)\bar{C} \cdot \bar{A}(\bar{B} + \bar{C})$

8.13 将下列逻辑函数化为最小项之和及最大项之积的形式

- $F = A\bar{B}\bar{C} + BC = A\bar{B}\bar{C} + ABC + \bar{A}BC = m_3 + m_6 + m_7 = \prod M(0,1,2,4,5)$

$$2. F = \overline{A\bar{C} + BC} = (\bar{A} + C)(\bar{B} + \bar{C}) = \bar{A}\bar{B} + \bar{A}\bar{C} + C\bar{B}$$

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

$$= \bar{A}\bar{B}\bar{C} + \bar{A}\bar{B}C + \bar{A}B\bar{C} + A\bar{B}C = m_0 + m_1 + m_2 + m_5$$

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

$$3. F = (A + \bar{B})(A + C) = A + AC + A\bar{B} + \bar{B}C = A + \bar{B} + \bar{B}C$$

BC	00	01	11	10
A	0	0	1	0
1	1	1	1	1

$$F = \sum m(1, 4, 5, 6, 7)$$

$$= \prod M(0, 2, 3)$$

8.15

$$1. F = ABC + ABD + \bar{C}\bar{D} + A\bar{B}C + \bar{A}C\bar{D}$$

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

$$F = \bar{D} + AC + AB$$

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

Three Karnaugh maps for a 4-variable function. The first map has a group of four 1s in the top-right quadrant. The second map has a group of four 1s in the top-left quadrant. The third map has a group of four 1s in the right half. An arrow points from the first two maps to the third, indicating a simplification step.

$$F_2 = \overline{A}\overline{B}C + \overline{A}B\overline{C} + A\overline{B}\overline{C} + ABC$$

$$F_2 = \overline{A}(\overline{B}C + B\overline{C}) + A(\overline{B}\overline{C} + B\overline{C})$$

$$F_2 = \overline{A}(C \oplus \overline{C}) + A(\overline{B} + B)\overline{C}$$

$$F_2 = \overline{A}(1) + A(\overline{B} + B)\overline{C}$$

$$F_2 = \overline{A} + A(\overline{B} + B)\overline{C}$$

$$F_2 = \overline{A} + A\overline{C}$$

$$F_2 = \overline{A} + A\overline{C}$$

$$F_2 = \overline{A} + A\overline{C}$$

$$F_2 = \overline{A} + A\overline{C}$$

$$F_2 = \overline{A} + A\overline{C}$$

$$F_2 = \overline{A} + A\overline{C}$$

$$F_2 = \overline{A} + A\overline{C}$$

$$F_2 = \overline{A} + A\overline{C}$$

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

$$5. F = \sum m(0, 1, 3, 5, 6, 7, 11, 13)$$

AB \ C	00	01	11	10
00	1	1	1	0
01	0	1	1	1
11	0	1	0	0
10	0	0	1	0

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

8.16 $F = \sum m(1, 2, 4, 11, 13, 14) + \sum d(8, 9, 10, 12, 15)$

	00	01	11	10
00	0	1	0	1
01	1	0	0	0
11	X	1	X	1
10	X	X	1	X

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

8.17 将下列逻辑函数化简为与或式、与非-与非式、或非-或非式、与或非式

解: $F = A\bar{B} + B \oplus C = A\bar{B} + B\bar{C} + \bar{B}C$;

		00	01	11	10
A \ B	C				
0	0	0	1	0	1
1	0	1	1	0	1

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

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

$$= \overline{\bar{A} + B + C} + \overline{\bar{B} + \bar{C}}$$

最简与或式: $F = A\bar{B} + B\bar{C} + \bar{B}C$;

最简与非与非式: $F = \overline{\overline{A\bar{B}} \overline{B\bar{C}} \overline{\bar{B}C}}$

最简与或非式: $F = \overline{\bar{A}\bar{B}\bar{C} + BC}$

最简或非或非式: $F = \overline{\overline{A+B+C} + \overline{\bar{B}+\bar{C}}}$