

8. 下列各等式分別是依據哪一項布林法則導出來的

- (a) $\overline{AB+CD} + \overline{EF} = \overline{AB} + \overline{CD} + \overline{EF}$ = 9法則 $\overline{\overline{A}} = A$
- (b) $A\overline{A}B + A\overline{B}C + AB\overline{B} = A\overline{B}C$ = 8法則 $A \cdot \overline{A} = 0$
- (c) $AC(BC+BC) + AC = AC(BC) + AC$ = 5法則 $A+A=A$
- (d) $ABC\overline{C} + C + AC = AB + AC$ = 6法則 $A + \overline{A} = 1$
- (e) $A\overline{B} + A\overline{B}C = A\overline{B}$ = 2法則 $A + 1 = 1$
- (f) $ABC + \overline{A}B + \overline{A}BCD = ABC + \overline{A}B + D$ = 6法則 $A + \overline{A} = 1$

9. 在下列各表示式中應用狄摩根定理

- (a) $\overline{A+B} = \overline{A} \cdot \overline{B}$
- (b) $\overline{AB} = \overline{A} + \overline{B}$
- (c) $\overline{A+B+C} = \overline{A} \cdot \overline{B} \cdot \overline{C}$
- (d) $\overline{ABC} = \overline{A} + \overline{B} + \overline{C}$
- (e) $\overline{ACD+E} = \overline{A} \cdot \overline{C} \cdot \overline{D} + \overline{E}$
- (f) $\overline{AB+CD} = \overline{A} + \overline{B} + \overline{C} + \overline{D}$
- (g) $\overline{AB+CD} = (\overline{A} + \overline{B}) \cdot (\overline{C} + \overline{D})$
- (h) $\overline{(A+B)(C+D)} = (\overline{A} \cdot \overline{B}) + (\overline{C} + \overline{D})$

10. 使用 NAND 閘, NOR 閘或兩者的組合來實現下列邏輯表示式

(a) $X = \overline{AB+CD} + \overline{C+A+B} (ACD + \overline{E}) = \overline{A+B} + \overline{C+D} + \overline{A+B+C} + \overline{A+B+C} \cdot \overline{E}$

(b) $X = \overline{AB\overline{C}D} + \overline{D\overline{E}F} + \overline{A+B} \cdot \overline{C+D} + \overline{E+F} + \overline{A+B}$

10. 在下列各表示式中應用狄摩根定理

- (a) $\overline{A\overline{B}C+D} = \overline{A} + \overline{B} + \overline{C} + \overline{D}$
- (b) $\overline{AB(CD+\overline{E}F)} = \overline{A} + \overline{B} + \overline{C} + \overline{D} + \overline{E} + \overline{F}$
- (c) $\overline{(A+B+C+D) + ABCD} = \overline{A} + \overline{B} + \overline{C} + \overline{D} + \overline{A} \cdot \overline{B} \cdot \overline{C} \cdot \overline{D}$
- (d) $\overline{(A+B+C+D)(A\overline{B}C\overline{D})} = (\overline{A} + \overline{B} + \overline{C} + \overline{D}) + (A \cdot \overline{B} \cdot C \cdot \overline{D})$

(c) $X = \overline{A\overline{B}C+D} = \overline{A} + \overline{B} + \overline{C} + \overline{D}$

11. 根據表 5-6 的真值表來實現其邏輯電路

真值表:

| A | B | C | X |
|---|---|---|---|
| 0 | 0 | 0 | 1 |
| 0 | 0 | 1 | 0 |
| 0 | 1 | 0 | 1 |
| 0 | 1 | 1 | 0 |
| 1 | 0 | 0 | 0 |
| 1 | 0 | 1 | 0 |
| 1 | 1 | 0 | 1 |
| 1 | 1 | 1 | 0 |

邏輯電路: $X = \overline{C} + AB$

12. 根據表 5-7 的真值表將邏輯電路實現出來

真值表:

| A | B | C | X |
|---|---|---|---|
| 0 | 0 | 0 | 0 |
| 0 | 0 | 1 | 0 |
| 0 | 1 | 0 | 1 |
| 0 | 1 | 1 | 1 |
| 1 | 0 | 0 | 0 |
| 1 | 0 | 1 | 1 |
| 1 | 1 | 0 | 1 |
| 1 | 1 | 1 | 1 |

邏輯電路: $X = AB + BC + ACD$

利用卡諾圖找出各表示式的最小 SOP 形式

1) $\overline{A}\overline{B}\overline{C} + \overline{A}B\overline{C} + A\overline{B}\overline{C}$ $A = \overline{A}$ (Karnaugh map) $(c) \overline{A}(BC + \overline{B}C) + A(\overline{B}C + B\overline{C})$ $(d) \overline{A}B\overline{C} + \overline{A}\overline{B}\overline{C} + A\overline{B}\overline{C}$

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

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

2) $AC(B+C)$ $(c) \overline{A}\overline{B}\overline{C} + \overline{A}B\overline{C} + A\overline{B}\overline{C} + A\overline{B}C$

$\overline{A}\overline{B}\overline{C} + AC$ $(d) \overline{A}\overline{B}\overline{C} + \overline{A}B\overline{C} + A\overline{B}\overline{C} + A\overline{B}C$

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

利用卡諾圖將下列各表示式化簡成最小 SOP 形式:

1) $D\overline{E}\overline{F} + D\overline{E}F + D\overline{E}F = \overline{D}\overline{F} + \overline{E}F$

Karnaugh map for $D\overline{E}\overline{F} + D\overline{E}F + D\overline{E}F$ showing simplification to $\overline{D}\overline{F} + \overline{E}F$.

2. 利用卡諾圖將下列各表示式簡化成最小 SOP 形式:

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

Karnaugh map for $A + B\overline{C} + CD$ showing simplification to $A + B\overline{C} + CD$.

2) $\overline{A}B\overline{C}\overline{D} + \overline{A}B\overline{C}D + \overline{A}B\overline{C}D + \overline{A}B\overline{C}\overline{D} = \overline{A}B\overline{C} + \overline{A}B\overline{C}$

Karnaugh map for $\overline{A}B\overline{C}\overline{D} + \overline{A}B\overline{C}D + \overline{A}B\overline{C}D + \overline{A}B\overline{C}\overline{D}$ showing simplification to $\overline{A}B\overline{C} + \overline{A}B\overline{C}$.

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

Karnaugh map for $\overline{A}B\overline{C}\overline{D} + \overline{A}B\overline{C}D + \overline{A}B\overline{C}D + \overline{A}B\overline{C}\overline{D}$ showing simplification to $\overline{A}B\overline{C} + \overline{A}B\overline{C}$.

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

Karnaugh map for $(\overline{A}B + \overline{A}B)(\overline{C}\overline{D} + \overline{C}D)$ showing simplification to $\overline{A}B\overline{C} + \overline{A}B\overline{C}$.

5) $\overline{A}B + \overline{A}B + \overline{C}\overline{D} + \overline{C}D = \overline{B} + \overline{D}$

Karnaugh map for $\overline{A}B + \overline{A}B + \overline{C}\overline{D} + \overline{C}D$ showing simplification to $\overline{B} + \overline{D}$.

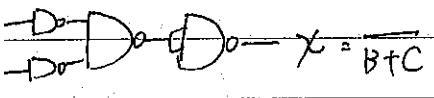
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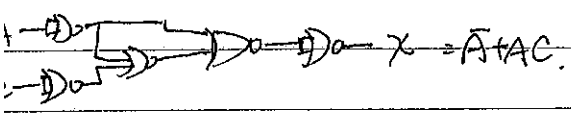
9 只用 NAND 閘, 實現出 5-42 的邏輯電路

$$\overline{B+B+C} = \overline{AB \cdot B \cdot C} = \overline{A \overline{B} C + BC} = \overline{B \overline{C}} = \overline{B} C$$

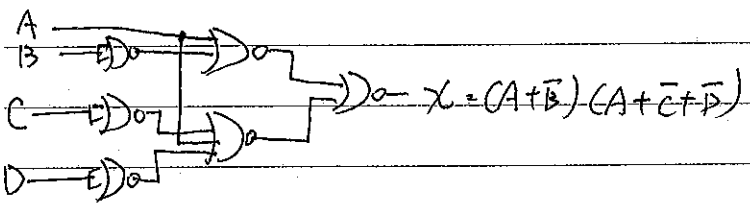


10 只用 NOR 閘重做問題 18

a) $\overline{A+AB+AC} = \overline{A+AC}$



b) $\overline{AB + \overline{A}CD + B\overline{C}D} = \overline{A} \overline{B} \cdot \overline{A} \overline{C} D = (A+B)(A+\overline{C}+\overline{D})$



21 只用 NOR 閘重做問題 19

$$\overline{AB+B+C+C} = \overline{AB \cdot B \cdot C} = \overline{A \overline{B} C + BC} = \overline{B \overline{C}} = \overline{B} C$$

