

Midterm One Solution

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1. (9%) 一小題3分

1. (6%)

$$(a) \ 654_7 + 013_7 = 000_7 \quad \Rightarrow \text{base 7, overflow}$$

$$(b) \ 024_5 + 043_5 + 013_5 + 033_5 = 223_5 \quad \Rightarrow \text{base 5}$$

$$(c) \ 024_6 + 043_6 + 013_6 + 033_6 = 201_6 \quad \Rightarrow \text{base 6}$$

沒寫overflow : -1

沒寫base : -1

2. (6%) 一小題3分

(a) $222.22_{(10)}$

$$\begin{array}{r} 16 \overline{) 222} \\ \underline{16} \\ 62 \\ \underline{48} \\ 14 \end{array} \quad \begin{array}{l} r=14 \text{ (E)} \\ 0 \quad r=13 \text{ (D)} \end{array}$$

$$\begin{array}{r} 0.22 \\ \underline{16} \\ (3).52 \\ \underline{16} \\ (8).32 \\ \underline{16} \\ (5).12 \\ \underline{16} \\ (1).92 \end{array}$$

$$\Rightarrow 222.22_{(10)} \div DE.3851_{(16)}$$

DE . 38 5 1

@2分

HTML \Rightarrow 68 69 46 51 56 53 49

@1分

HEX \Rightarrow 44 45 2E 33 38 35 31

2. (6%) 一小題3分

(b)

183.81 (10)

16 | 183 7

16 | 11 11 (B)
0

$\Rightarrow 183.81 (10) = B7.CF5C$

B 7 . C F 5 C

81
16

C (12).96

16

F (15).36

16

5 (5).76

16

C (12).16

@2分

@1分

HTML \Rightarrow 66 55 46 67 70 53 67

HEX \Rightarrow 42 27 2F 43 46 35 43

3. (10%) 找到相對(2) 幾個1(1) ans(2)

- N: 1001110 => N有4個1
- Even parity = 0 (使其偶數個1)
- Odd parity = 1 (使其奇數個1)

3. (10%) 找到相對(2) 幾個1(1) ans(2)

	Even parity bit	Odd parity bit
N: 1001110	0	1
C: 1000011	1	0
T: 1010100	1	0
U: 1010101	0	1
D: 1000100	0	1
E: 1000101	1	0
E: 1000101	1	0
E: 1000101	1	0
I: 1001001	1	0
S: 1010011	0	1
T: 1010100	1	0
H: 1001000	0	1
E: 1000101	1	0
L: 1001100	1	0

	Even parity bit	Odd parity bit
I: 1001001	1	0
G: 1000111	0	1
H: 1001000	0	1
T: 1010100	1	0
O: 1001111	1	0
F: 1000110	1	0
T: 1010100	1	0
H: 1001000	0	1
E: 1000101	1	0
W: 1010111	1	0
O: 1001111	1	0
R: 1010010	1	0
L: 1001100	1	0
D: 1000100	0	1

4. (10%) 一小題5分

有寫算式給3分

4. (10%)

$$\begin{aligned} F &= \left\{ (A+B)' + [A + (A+B)']' \right\} \cdot [A + (A+B)']' \\ &= \left\{ A'B' + [A' \cdot (A+B)] \right\} \cdot [A' \cdot (A+B)] \\ &= (A'B' + A'B)(A'B) \\ &= \underline{A'B} \end{aligned}$$

4. (10%) 一小題5分

有寫算式給3分

$$\begin{aligned} G &= \left\{ \left[(R+S+T)' \cdot P \cdot (R+S)' \cdot T \right]' \cdot T \right\}' \\ &= \left[(R+S+T)' \cdot P \cdot (R+S)' \cdot T \right] + T' \\ &= \left[R'S'T' \cdot P \cdot R'S' \cdot T \right] + T' \\ &= \underline{T'} \end{aligned}$$

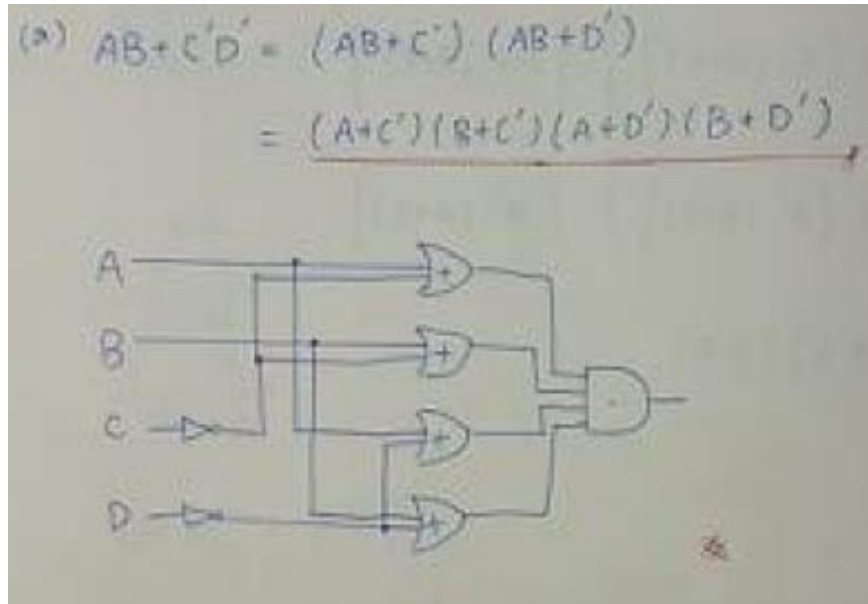
5. (10%) G 錯1格扣1分

5.(10%)	A	B	C	$F = (A' + B) \cdot C$	$H = F + G$	G
	0	0	0	0	0	0
	0	0	1	1	1	X
	0	1	0	0	1	1
	0	1	1	1	1	X
	1	0	0	0	0	0
	1	0	1	0	1	1
	1	1	0	0	0	0
	1	1	1	1	1	X

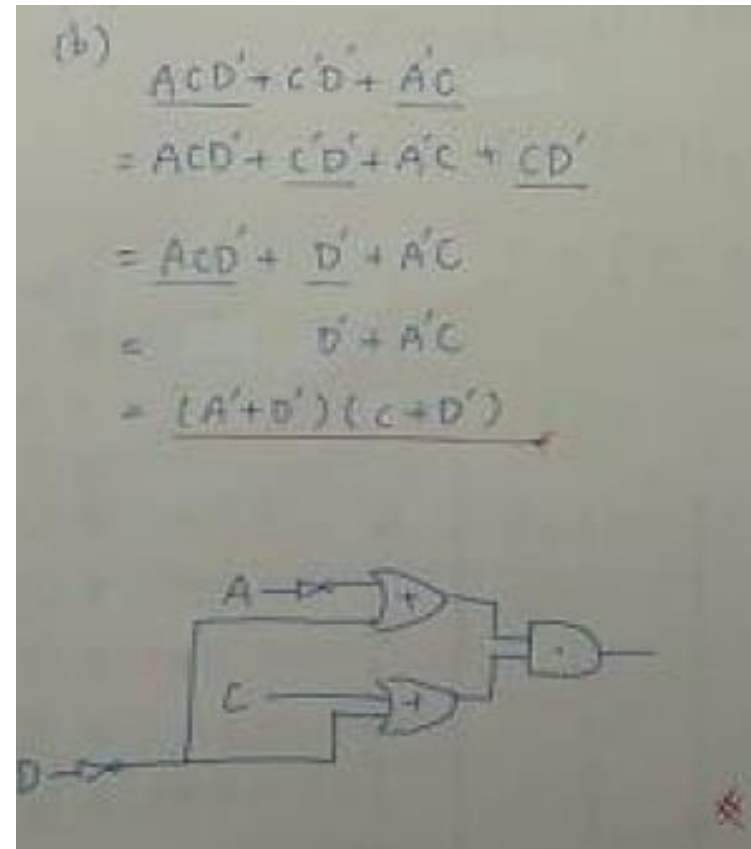
6. (10%) 一小題5分

有寫算式給3分

Use $X+YZ = (X+Y)(X+Z)$



Use $XY + X'Z = XY + X'Z + YZ$



7. (10%)真值表5分 布林代數 5分

有寫算式給3分

7. (10%)

A	B	C	F
0	0	0	0
0	0	1	0
0	1	0	0
0	1	1	1
1	0	0	0
1	0	1	1
1	1	0	1
1	1	1	1

$$\begin{aligned} F &= A'BC + AB'C + \underline{ABC'} + \underline{ABC} \\ &= A'BC + \underline{AB'C} + \underline{AB} \\ &= A'BC + \underline{AB'C} + AB + \underline{AC} \\ &= \underline{A'BC} + \underline{AB} + AC \\ &= \underline{A'BC} + AB + AC + \underline{BC} \\ &= \underline{AB + AC + BC} \end{aligned}$$

8. (10%) (a) 5分 (b) 5分

X Y Z 錯一個扣2分 (a)(b)最多扣至5分

若無寫成minterm maxterm 形式，(a) (b) 各扣1分

8. (10%)

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

(a) $X = \sum m(15)$

$Y = \sum m(3, 5, 6, 7, 9, 10, 11, 12, 13, 14)$

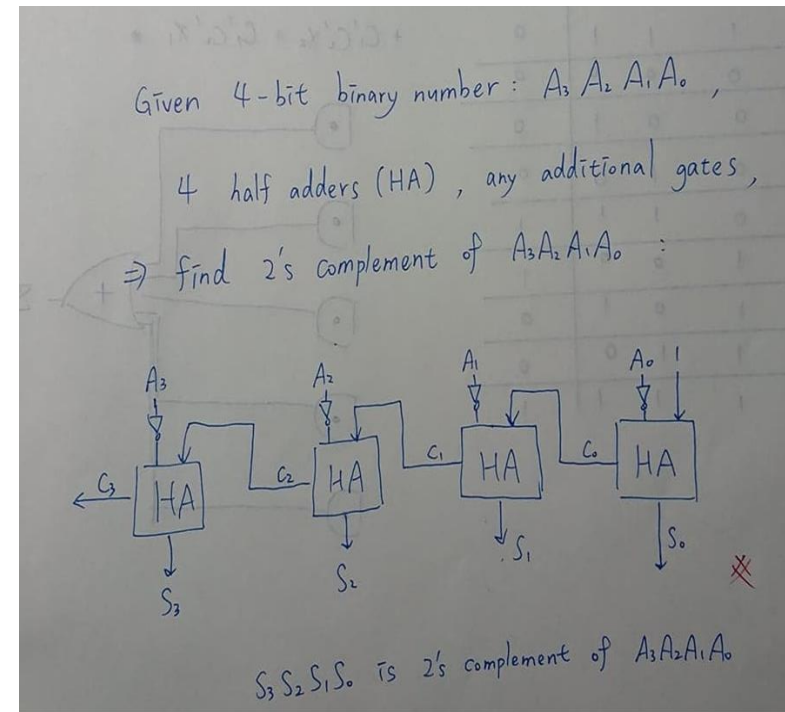
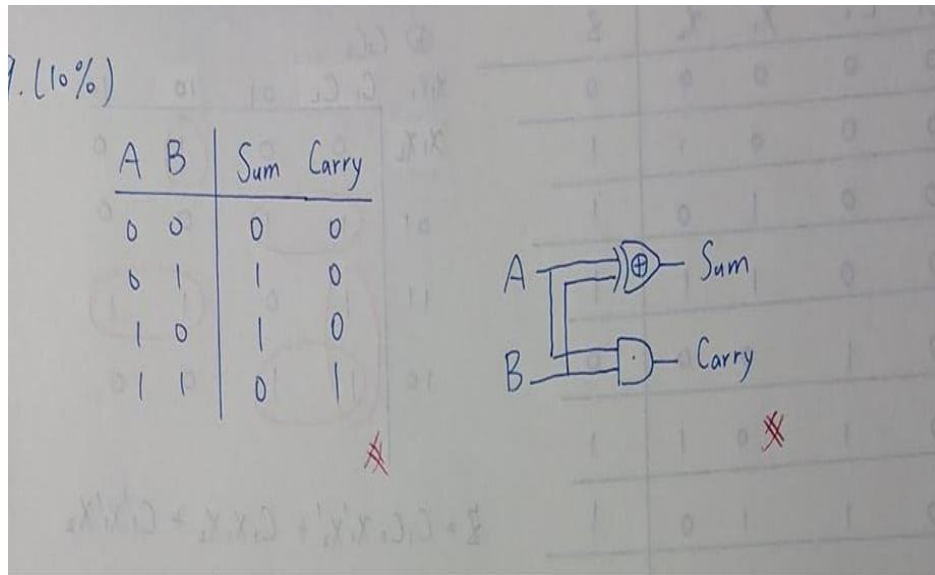
$Z = \sum m(1, 2, 4, 7, 8, 11, 13, 14)$

(b) $X = \prod M(0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14)$

$Y = \prod M(0, 1, 2, 4, 8, 15)$

$Z = \prod M(0, 3, 5, 6, 9, 10, 12, 15)$

9. (10%) Half Adder 5分(真值表2分 電路3分) 2's complement電路 5 分



10. (10%) (a) 5分(真值表錯1格扣1分，至多扣至5分) (b) 5 分

C_1	C_2	X_1	X_2	Z
0	0	0	0	0
0	0	0	1	1
0	0	1	0	1
0	0	1	1	1
0	1	0	0	0
0	1	0	1	1
0	1	1	0	1
0	1	1	1	0
1	0	0	0	0
1	0	0	1	0
1	0	1	0	0
1	0	1	1	1
1	1	0	0	1
1	1	0	1	0
1	1	1	0	0
1	1	1	1	1

$\begin{matrix} C_1C_2 \\ X_1X_2 \end{matrix}$	00	01	11	10
00	0	0	1	0
01	1	1	0	0
11	1	0	1	1
10	1	1	0	0

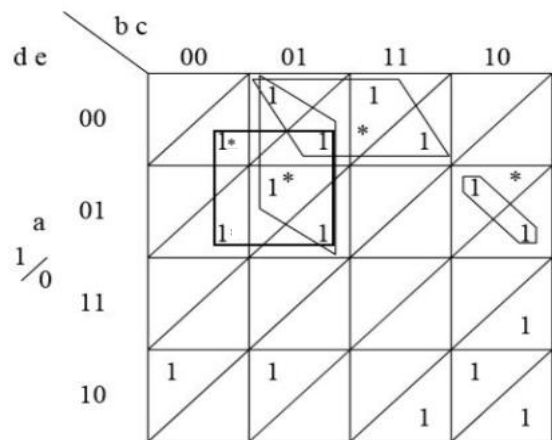
$$Z = C_1'X_1X_2' + C_1'C_2'X_1 + C_1X_1X_2 + C_1'X_1'X_2 + C_1C_2X_1'X_2'$$

$$C_1'C_2'X_1 \rightarrow C_1'C_2'X_2$$

$$C_1'C_2'X_1 \rightarrow X_1X_2C_2'$$

11. (10%) 一小題5分

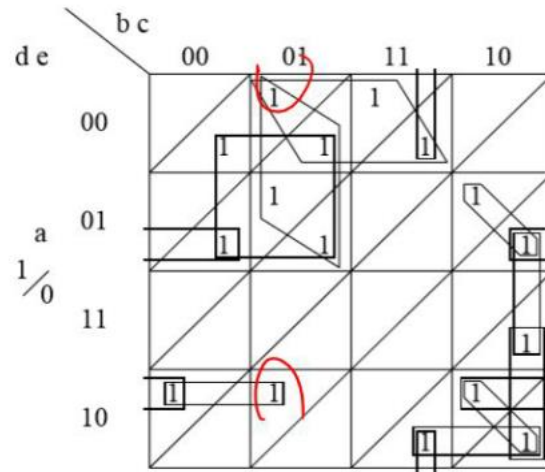
(a)



(*) Indicates a minterm that makes the corresponding prime implicant essential.

$$a'b'd' \rightarrow m_{15}, cd'e' \rightarrow m_{28}; bc'd'e \rightarrow m_{25}; b'cd' \rightarrow m_{21}$$

(b)



a'b'd', cd'e', bc'd'e, b'cd', ac'de', ab'ce', ab'de', a'c'd'e,
a'bc'e, a'bc'd, bc'de', a'bde', a'bce'