$(X+Y)(X+Z) = X+YZ$ $\quad (X+Y)(X'+Z) = XZ+X'Y$

$(X+Y)(X+Y') = X \quad \Leftrightarrow \quad XY+XY' = X$

$X+XY = X \quad \Leftrightarrow \quad X(X+Y) = X$

$(X+Y')Y = XY \quad \Leftrightarrow \quad XY'+Y = X+Y$

$(X+Y)(X'+Z)(Y+Z) = (X+Y)(X'+Z) \Leftrightarrow XY+X'Z+YZ = XY+X'Z$

$667_{10} \rightarrow 000$

1 1 1

0 0 0

$-5 \quad -6$

0101 0110

1010 1001

$5 + -6$ 9 9 11

1 1

1002

1010

1001

11|0011

0101

1001

1110

8+4+2

0001

1.

$654_7 + 013_7 = 000_7$ → base 7, overflow

$024_5 + 043_5 + 013_5 + 033_5 = 223_5$ → base 5, overflow

5 不是10

22
024
043
013
033
223

$024_6 + 043_6 + 013_6 + 033_6 = 201_6$ → base 6, overflow

2
024
043
013
033
201

12
6 ✓
4
3

2.

(a)

16|222
16|13 ... 14 → E
0 ... 13 → D

$222.22_{10} = DE.3851_{16}$

.22
× 16
132
22
(3.52
16
312
52
(8).32
16
192
32
(5).12
16
72
12
(11.92

HTML ⇒ 68 69 51 56 53 49

Hex ⇒ 44 45 33 38 35 31

(b)

16|183
16|11 ... 7
0 ... 11 → B

183.81_{10}
$= 7B.CF5C_{16}$

.81
16
486
81
(12).96 → C
16
576
96
(15).36 → F
16
216
36
(5).76
16
456
76
(12).16 → C

HTML
⇒ 55 66 67 70 53 67

Hex
⇒ 37 42 43 46 35

43

3.

	Hx	Bin	對分符1	Even	Odd
N	4E	0100 1110	4	0	1
C	43	0100 0011	3	1	0
T	54	0101 0100	3	1	0
V	55	0101 0101	4	0	1
D	44	0100 0100	2	0	1
E	45	0100 0101	3	1	0
E	45	0100 0101	3	1	0
E	45	0100 0101	3	1	0

$16 \overline{)122}$
$16 \overline{)7} \cdots 10 \to A$
$0 \cdots 7$

$122.$ $\geq 2_{10}$

$= 7A.385\,1_{16}$

$.22$
$\times \quad 16$
132
22
$(3\,52$
16
312
52
$(8\,32$
16
$(5\,12$
16
72
12
$(12\,92$

$16 \overline{)83}$
$16 \overline{)17} \cdots 11 \to B$
$16 \overline{)1} \cdots 1$
$0 \cdots 1$

83.81_{10}

$= 11B.CF5C_{16}$

12
112

$.81$
$\times \quad 16$
486
81
$(12.96$ → C
16
576
96
$(15)36$ → F
16
216
36
$(5.76$
16
456
$(12).16$ → C

4.

$$F = \left[A'B' + (A'B'+A)'\right](A'B'+A)'$$

$$= (A'B'+A)' = (A+B')' = A'B$$

$(X+Y)X$

$= X + XY$

$= X(1+Y) = X$

$X + X'Y$

$= X+Y$

$R'S'T' \cdot R'S'T \cdot P = 0$

$G = T'$

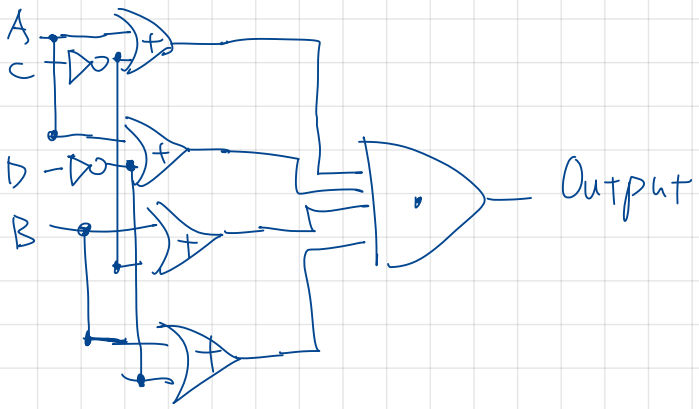
5.

A	B	C	H	(A'+B)	F	G
0	0	0	0	1	0	0
0	0	1	1	1	1	X
0	1	0	1	1	0	1
0	1	1	1	1	1	X
1	0	0	0	0	0	0
1	0	1	1	0	0	1
1	1	0	0	1	0	0
1	1	1	1	1	1	X

F+G=H

6. $AB + C'D'$

$= (A+C')(A+D')(B+C')(B+D')$



7.

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

$A'BC + AB'C + ABC' + ABC$

$= A'BC + AB'C + AB$

$= A'BC + A(B+C)$

$= B(A+C) + AC$

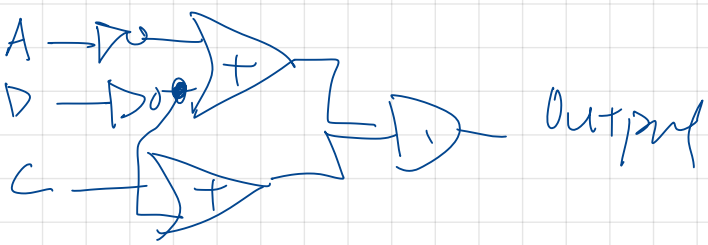
$= AB + BC + AC$

$ACD' + C'D' + A'C$

$= ACD' + A'C + CD' + C'D'$

$= ACD' + A'C + D'$

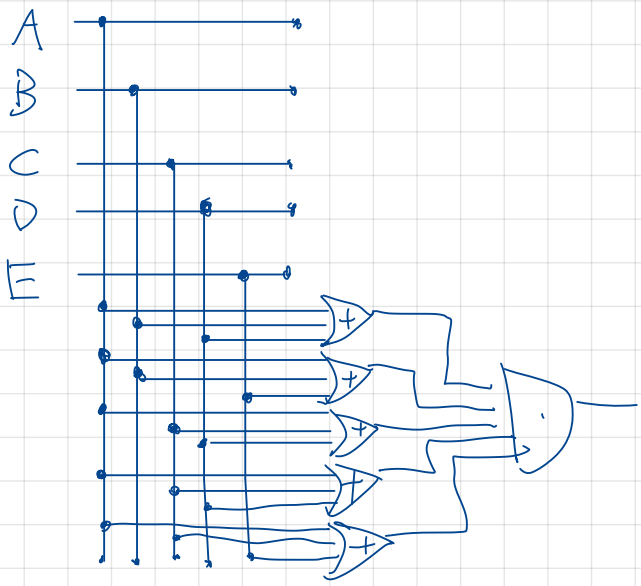
$= A'C + D' = (A'+D')(C+D')$



$A + BC + DE$

$= A + (B+D)(B+E)(C+D)(C+E)$

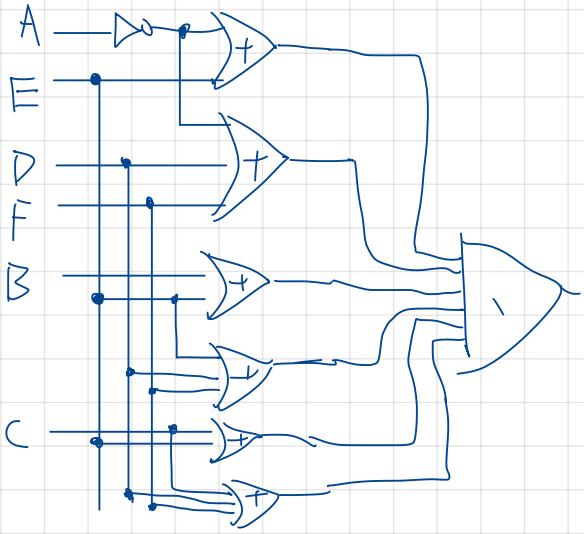
$= (A+B+D)(A+B+E)(A+C+D)(A+C+E)$



$A'BC + EF + DE'$

$= A'BC + E(F+D)$

$= (A'+E)(A'+D+F)$
$(B+E)(B+D+F)$
$(C+E)(C+D+F)$



8.

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)

$X = m_{15}$

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

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

(b)

$X = \pi M(0,1,2,\ldots,14)$

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

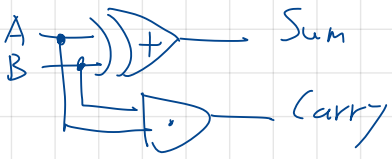
$Z = \pi M(0,3,5,6,9,10,12,15)$

9.

A	B	Sum	Carry
0	0	0	0
0	1	1	0
1	0	1	0
1	1	0	1

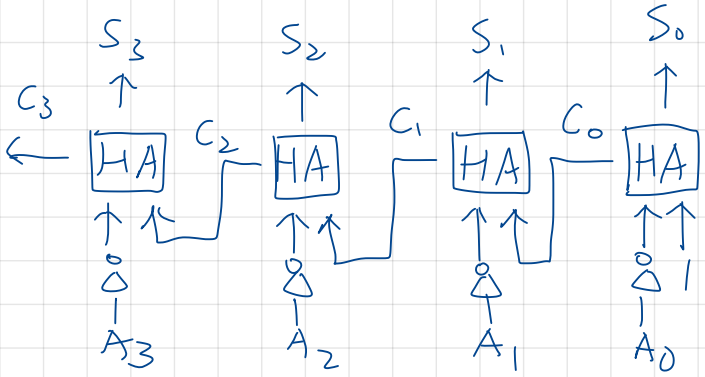
$Sum = A \oplus B$

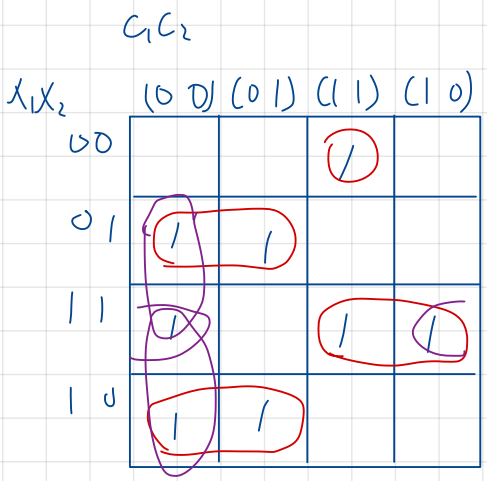
$Carry = AB$



10.

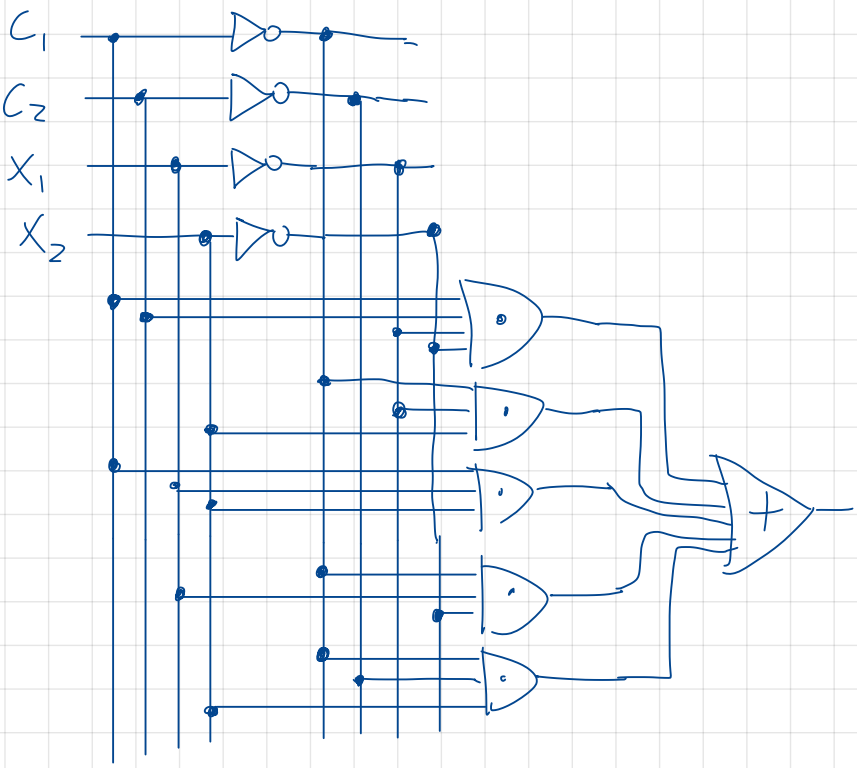
C_1	C_2	X_1	X_2	Z
0	0	0	0	0
0	0	0	1	1
0	0	1	0	1
0	0	1	1	1
0	1	0	0	0
0	1	0	1	1
0	1	1	0	1
0	1	1	1	0
1	0	0	0	0
1	0	0	1	0
1	0	1	0	0
1	0	1	1	1
1	1	0	0	1
1	1	0	1	0
1	1	1	0	0
1	1	1	1	1





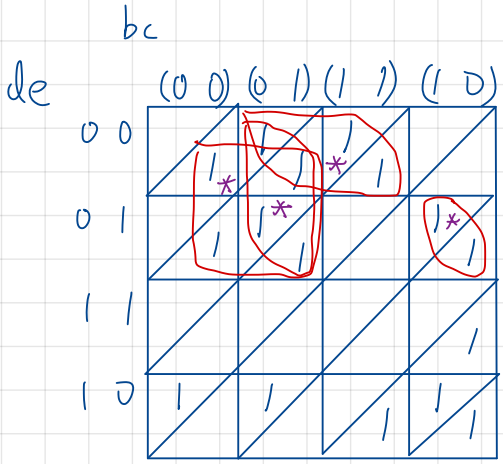
$Z = C_1C_2X_1'X_2'$
$+ C_1'X_1'X_2$
$+ C_1X_1X_2$
$+ C_1'X_1X_2'$
$+ \{ C_1'C_2'X_2 \text{ or } C_2'X_1X_2 \text{ or } C_1'C_2'X_1 \}$

$$z = c_1 c_2 x_1' x_2' + c_1' x_1' x_2 + c_1 x_1 x_2 + c_1' x_1 x_2' + \{ c_1' c_2' x_2 \text{ or } c_2' x_1 x_2 \text{ or } c_1' c_2' x_1 \}$$



11.

a (1/0)

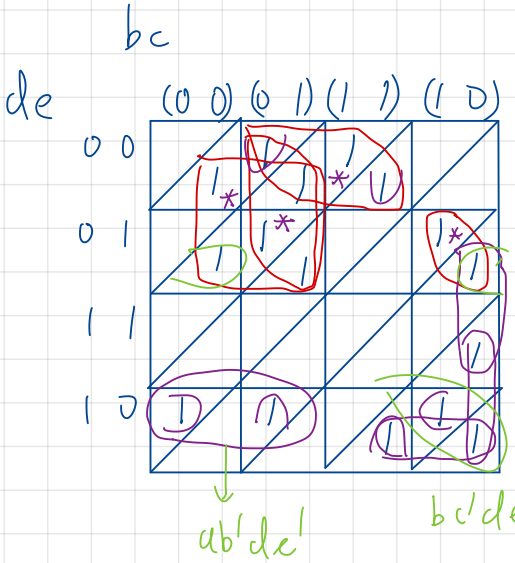


Essential PI:

$b'cd' \to m_{21}$ $\quad cd'e' \to m_{28}$

$a'b'd' \to m_0$ $\quad bc'd'e \to m_{25}$

a (1/0)



PI:

$b'cd'$, $cd'e'$

$a'b'd'$, $bc'd'e$

$ab'ce'$, $a'bce'$,

$a'bc'e$, $ac'de'$,

$ab'ce'$, $a'bde'$,

$a'bc'd$

$ab'de'$

$bc'de'$

$a'c'd'e$

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

F = output

$$F = A'BC + AB'C + ABC' + ABC$$
$$= A'BC + AB'C + AB$$
$$= A'BC + A(B+C)$$
$$= B(A+C) + AC = AB + BC + AC$$

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