LD Midterm (SW) 2023.4.10.

1. Conversion

(a) $A9.F6_{16} = \underline{1010}\,\underline{1001}.\,\underline{1111}\,\underline{0110}_2$

$= 251.754_8$

(b) $72.38 = 1 * 8^1 + 2 * 8^0 + 3 * 8^{-1}$

$= 56 + 2 + 0.375$

$= 58.375_{10}$

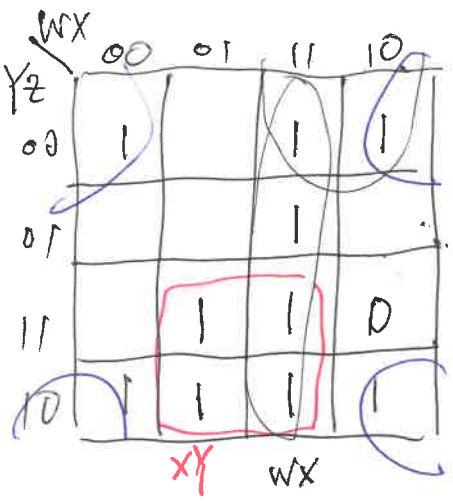
2. (a) $F(W,X,Y,Z) = (X+(Y'(Z+W)')')'$

$(Z+W)' = Z' \cdot W'$

$(Y' \cdot Z' \cdot W')' = Y + Z + W$

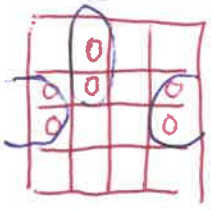
$(X + Y + Z + W)' = X' \cdot Y' \cdot Z' \cdot W'$

(b) $F(W,X,Y,Z) = WX + XY + X'Z' + WY'Z'$



$\therefore F = WX + XY + X'Z'$

Better Solution



$\therefore F' = X'Z + W'XY'$

3. (a) signed - 2's complement & 4-bit hardware.

Text PP110, Fig 4-6

(b) A : +5 0101

B : -4 1100

A - B = A + B' + 1

$$\begin{array}{r} \boxed{0\ 1}\ 1\ 1 \\ 0101 \\ 0011 \\ 1 \\ \hline 1001 \end{array}$$

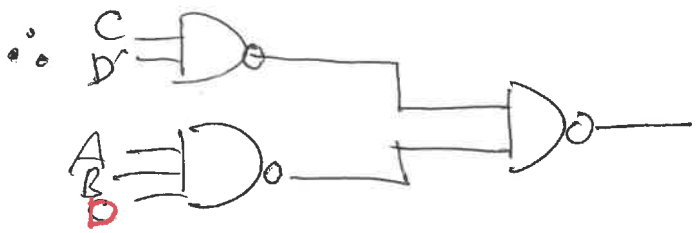
∴ overflow

4. Text PP 106, example 3.

(a) F = CD' + ABD

(b) based on

(Text PP 210, Fig 7-14)

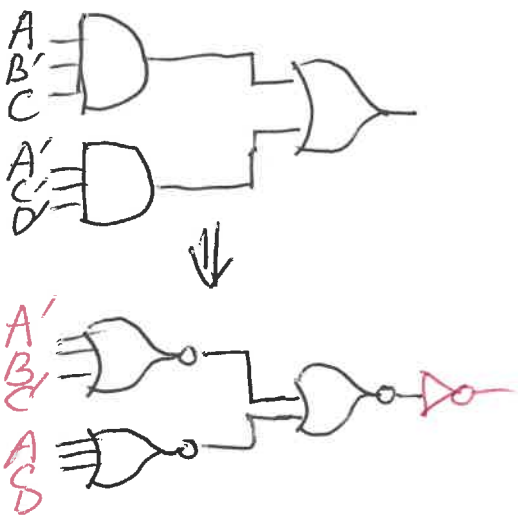
∴ 

5.

CD \ AB	00	01	11	10
00	1	X		X
01			X	
11	X			1
10				1

(a) $F = AB'C + \begin{cases} A'C'D' \\ B'C'D' \end{cases}$

Dual solution.

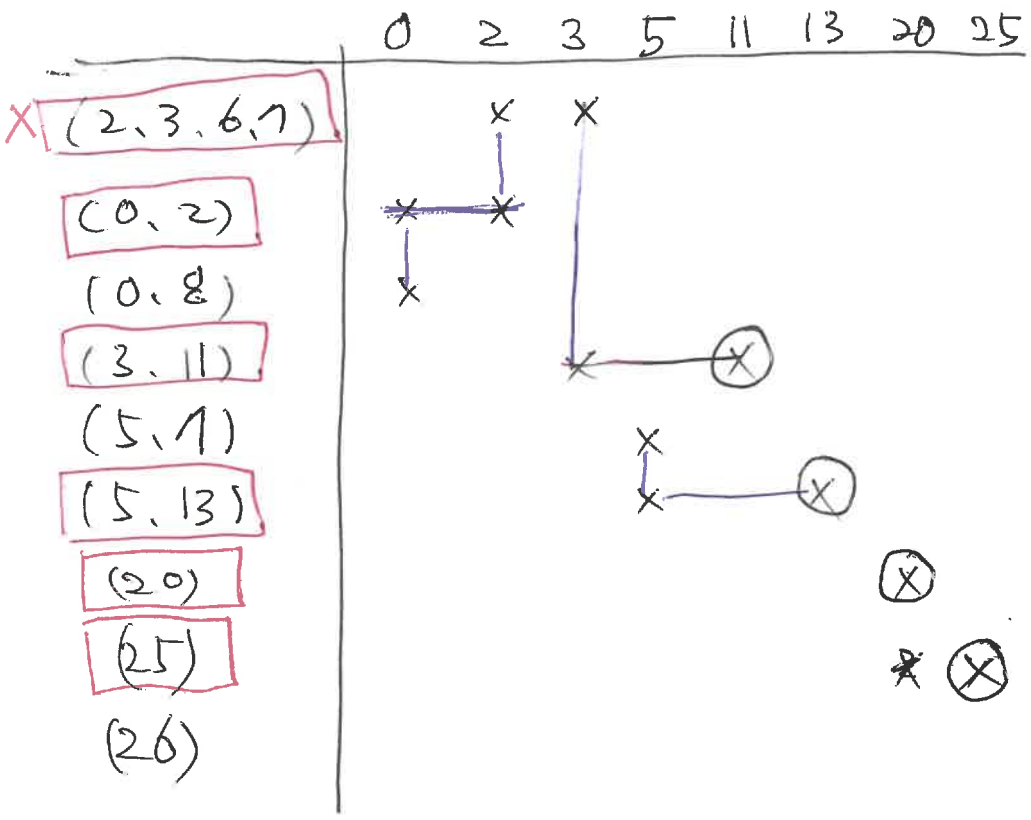
(b) 

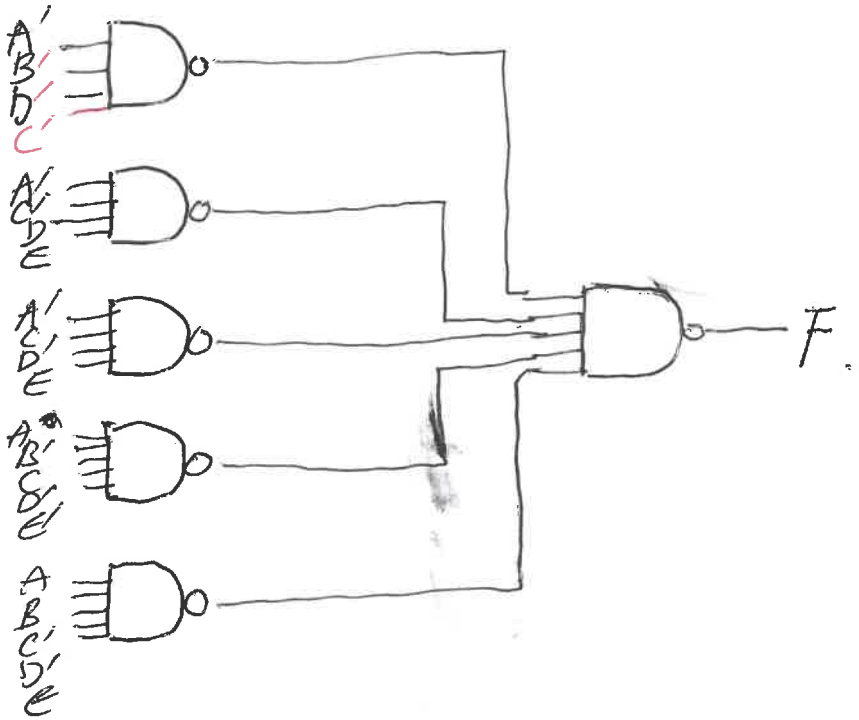
6. $F = \Sigma m(0,2,3,5,11,13,20,25) + \Sigma d(6,1,8,26)$

(a)

group 0	0	00000	✓	(0,2) 00-0 □	(2,3,6,7) 00-1-
group 1	2	00010	✓	(0,8) 0-000 □	~~(2,6,3,7) 00-1-~~
	8	01000	✓	(2,3) 0001- ✓	
group 2	3	00011	✓	(2,5)	
	5	00101	✓	(2,6) 00-10 ✓	
	6	00110	✓	(2,20)	
	20	10100	□	(8,3)	
group 3	7	00111	✓	(8,5)	
	11	01011	✓	(8,6)	
	13	01101	✓	(8,20)	
	25	11001	□	(3,7) 00-11 ✓	
	26	11010	□	(3,11) 0-011 □	
				(3,13)	
				(3,25)	
				(3,26)	
				(5,7) 001-1 □	
				(5,11)	
				(5,13) 0-101 □	
				(5,25)	
				(5,26)	
				(6,7) 0011- ✓	
				(6,11)	
				(6,13)	
				(6,25)	
				(6,26)	
				(20,7)	
				(20,11)	
				(20,13)	
				(20,25)	
				(20,26)	

PI. chart



$\therefore F = \cancel{A'B'D} + A'C'DE + A'CD'E + A'B'C'E' + AB'CD'E + ABCD'E$

b)