

19BCE0811

Arslan Simastan

A1) (a)  $(431)_{10} = (11010111)_2$

2	431	1
2	215	1
2	107	1
2	53	1
2	26	0
2	13	1
2	6	0
2	3	1
	1	→ 1

(b)  $(431)_{10} = (1AF)_{16} = (11010111)_2$

16	431	15 (F)
16	26	10 (A)
16	1	→ 1

1	A	F
↓	↓	↓
0001	1010	1111

Method (b) is faster as the no. is simplified by a larger no. than in (a)

A2) (a)  $(10110.0101)_2 = (22.3125)_{10}$

$10110.0101$

$\Rightarrow 1 \times 2^4 + 0 \times 2^3 + 1 \times 2^2 + 0 \times 2^1 + 0 \times 2^0 + 1 \times 2^{-1} + 0 \times 2^{-2} + 1 \times 2^{-3}$

$\Rightarrow 22.3125$

$$\textcircled{b} (16.5)_{16} = (22.3125)_{10}$$

$$\begin{array}{ccccccc} & 1 & & 6 & & & 5 \\ \Rightarrow & 1 \times 16^1 & + & 6 \times 16^0 & + & 5 \times 16^{-1} \end{array}$$

$$\Rightarrow 16 + 6 + 0.3125$$

$$\Rightarrow \textcircled{b} 22.3125$$

$$\textcircled{c} (26.24)_8 = (22.3125)_{10}$$

$$\begin{array}{ccccccc} & 2 & & 6 & & & 2 & & 4 \\ \Rightarrow & 2 \times 8^1 & + & 6 \times 8^0 & + & 2 \times 8^{-1} & + & 4 \times 8^{-2} \end{array}$$

$$\Rightarrow 16 + 6 + 0.0625 + 0.25$$

$$\Rightarrow 22.3125$$

$$\textcircled{d} (DADA.D)_{16} = (56028.6875)_{10}$$

$$\begin{array}{ccccccc} & D & & A & & D & & A & & . & & B \\ \Rightarrow & 13 & & 10 & & 13 & & 10 & & & & 11 \\ \Rightarrow & 13 \times 16^3 & + & 10 \times 16^2 & + & 13 \times 16^1 & + & 10 \times 16^0 & + & 11 \times 16^{-1} \end{array}$$

$$\Rightarrow 5248 + 2560 + 208 + 10 + 0.6875$$

$$\Rightarrow 56028.6875$$

$$e) (1010.1101)_2 = (10.8125)_{10}$$

$$1 \times 2^3 + 0 \times 2^2 + 1 \times 2^1 + 0 \times 2^0 + 1 \times 2^{-1} + 1 \times 2^{-2} + 0 \times 2^{-3} + 1 \times 2^{-4}$$

$$\Rightarrow 8 + 0 + 2 + 0 + 0.5 + 0.25 + 0 + 0.0625$$

$$\Rightarrow 10.8125$$

$$A3) ⑥ (1.10010)_2 = (1.90)_{16} = (1.5625)_{10}$$

$$0001.1001.0000$$

$$\downarrow \quad \downarrow \quad \downarrow \quad \downarrow$$

$$1 \quad . \quad 9 \quad 0$$

$$\cancel{1 \times 2^0}$$

$$1.10010$$

$$1 \times 2^0 + 1 \times 2^{-1} + 0 \times 2^{-2} + 0 \times 2^{-3} + 1 \times 2^{-4} + 0 \times 2^{-5}$$

$$\Rightarrow 1 + 0.5 + 0 + 0 + 0.0625 + 0$$

$$\Rightarrow 1.5625$$

$$⑥ (110.010)_2 = (6.4)_{16} = (6.25)_{10}$$

$$0110.0100$$

$$\downarrow \quad \downarrow \quad \downarrow \quad \downarrow$$

$$6 \quad . \quad 4$$

$$110.010$$



$$\Rightarrow 1 \times 2^2 + 1 \times 2^1 + 0 \times 2^0 + 0 \times 2^{-1} + 1 \times 2^{-2} + 0 \times 2^{-3}$$

$$\Rightarrow 4 + 2 + 0 + 0 + 0.25 + 0$$

$$\Rightarrow 6.25$$

The decimal value of (b) is 4 times that of (a) due to change of pos<sup>n</sup> of radix point

A4) a)  $(27.315)_{10} = (11011.0101)_2$

2	27	$\rightarrow 1$
2	13	1
2	6	0
2	3	1
	1	$\rightarrow 1$

$$0.315 \times 2 = 0.630 \rightarrow 0$$

$$0.63 \times 2 = 1.26 \rightarrow 1$$

$$0.26 \times 2 = 0.52 \rightarrow 0$$

$$0.52 \times 2 = 1.04 \rightarrow 1$$

$$0.04 \times 2 = 0.08 \rightarrow 0$$

$$0.08 \times 2 = 0.16 \rightarrow 0$$

b)  $(2/3)_{10} = (0.6666)_{10} = (0.10101010)_2$

$$0.6666 \times 2 = 1.3332 \rightarrow 1$$

$$0.3332 \times 2 = 0.6664 \rightarrow 0$$

$$0.6664 \times 2 = 1.3328 \rightarrow 1$$

$$0.3328 \times 2 = 0.6656 \rightarrow 0$$

$$0.6656 \times 2 = 1.3312 \rightarrow 1$$

$$0.3312 \times 2 = 0.6624 \rightarrow 0$$

$$0.6624 \times 2 = 1.3248 \rightarrow 1$$

$$0.3248 \times 2 = 0.6496 \rightarrow 0$$

$$\Rightarrow 0.10101010$$

$$\Rightarrow 1 \times 2^{-1} + 0 \times 2^{-2} + 1 \times 2^{-3} + 0 \times 2^{-4} + 1 \times 2^{-5} + 0 \times 2^{-6} + 1 \times 2^{-7} + 0 \times 2^{-8}$$

$$\Rightarrow 0.6640625$$

The value is reduced by 0.00260417

$$\textcircled{C} (0.10101010)_{x_2} = (0.AA)_{16} = (0.6640625)_{10}$$

$$\begin{array}{ccccccc} 0 & 0 & 0 & 0 & . & 1 & 0 & 1 & 0 & 1 & 0 & 1 & 0 \\ & \downarrow & & \downarrow & & \downarrow & & \downarrow & & \downarrow & & & \\ & 0 & & & & A & & & & A & & & \end{array}$$

$$\Rightarrow 0 \times 16^0 + 10 \times 16^{-1} + 10 \times 16^{-2}$$

$$\Rightarrow 0 + 0.625 + 0.0390625$$

$$\Rightarrow 0.6640625$$

Yes the results of (b) and (c) are the same

$$\text{A5) } \textcircled{a} \Rightarrow F = A'(B+D')(C+D') + A'B(C+C')(D+D') + AD'C(D+D') + (A+A')BC(D+D')(X+X') = \square$$

$$\Rightarrow A'BCD + A'B'C'D + A'BC'D' + A'B'C'D' + A'BCD + A'B'C'D + A'BCD' + A'D'C'D + A'D'C'D' + A'D'C'D + A'D'C'D' + A'D'C'D + A'D'C'D'$$

$$\Rightarrow A'BCD + A'B'CD + A'BCD' + A'B'CD' + A'BC'D + A'BC'D' + A'B'CD + A'B'CD' + A'BCD + A'BCD'$$

$$F = m_2 + m_3 + m_4 + m_5 + m_6 + m_7 + m_{10} + m_{11} + m_{14} + m_{15}$$

$$m_2 + m_3 + m_4 + m_5 + m_6 + m_7 + m_{10} + m_{11} + m_{14} + m_{15}$$

$$\Rightarrow \Sigma (2, 3, 4, 5, 6, 7, 10, 11, 14, 15)$$

$$\textcircled{1} F = A'cD(B+B') + A'cD'(D+D') + A'Dc'(D+D') + AD'C(D+D') + ADc(D+D')$$

$$\Rightarrow A'CD + A'CD' + A'Dc' + AD'C + ADc$$

$$\Rightarrow A'(C(D+D')) + A'Dc' + AC(D+D')$$

$$\Rightarrow A'C + A'Dc' + AC$$

$$\Rightarrow (A' + A)C + A'Dc'$$

$$\Rightarrow C + A'Dc' \text{ The minimal SOP expression.}$$

A6)

$$\textcircled{2} F = A'B'C' + B'CD' + A'DcP' + AB'C'$$

$$\Rightarrow A'B'C'(D+D') + B'CD'(A+A') + A'DcP' + AD'C(D+D')$$

$$\Rightarrow A'B'C'D + A'B'C'D' + AB'CD' + A'B'CD' + A'BCD' + AB'C'D + AB'C'D'$$



$$\Rightarrow A'B'C'D + A'B'D'(C+C') + A'B'D'(C+C') + A'BCD' + AB'C'D$$

$$\Rightarrow B'C'D(A+A') + A'B'D'(C+C') + A'BCD' + AB'C'D$$

$$\Rightarrow B'C'D + A'B'D' + A'BCD' + AB'C'D$$

$$\Rightarrow B'C'D + B'D'(A+A') + A'BCD'$$

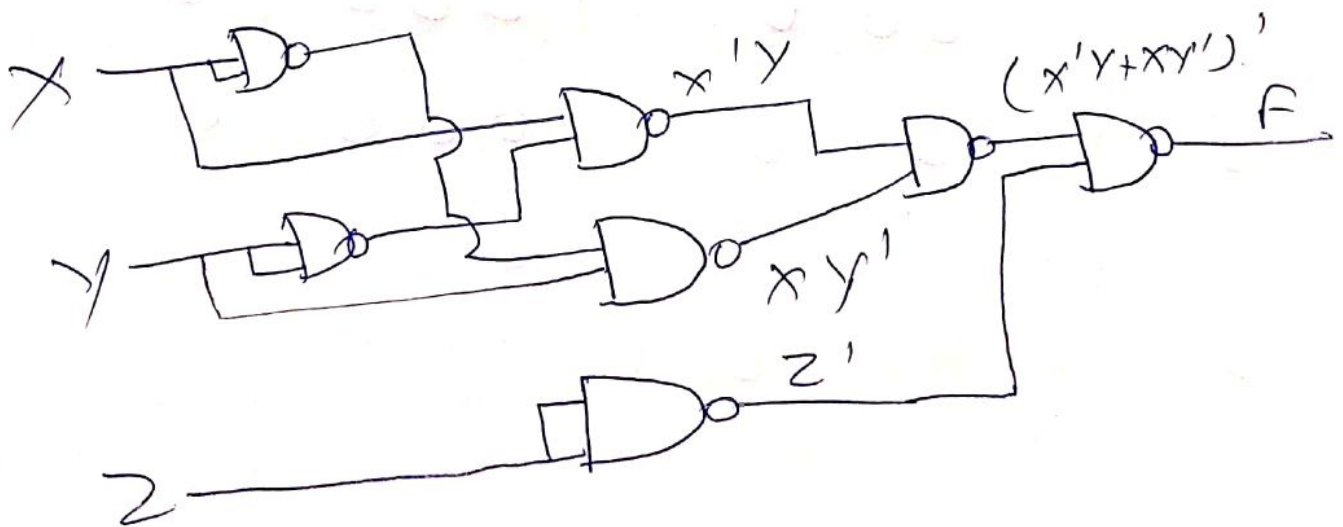
$$\Rightarrow B'C'D + B'D' + A'BCD'$$

$$A7) F(x, y, z) = (1, 2, 3, 4, 5, 7)$$

$$\Rightarrow m_1 + m_2 + m_3 + m_4 + m_5 + m_7$$

$x \ y$		00	01	11	10
0	0	0	1	0	1
1	1	1	1	1	1

$$\Rightarrow F = z + x'y + xy'$$



	W	X	Y	Z	X'	A	B	C	D	E	F
0	0	0	0	0	1	1	0	0	0	0	0
1	0	0	0	1	1	1	0	0	0	0	0
2	0	0	1	0	1	1	0	0	1	0	0
3	0	0	1	1	1	1	0	0	1	0	0
4	0	1	0	0	0	0	0	0	0	0	0
5	0	1	0	1	0	1	0	0	0	0	0
6	0	1	1	0	0	0	0	0	0	0	0
7	0	1	1	1	0	1	0	0	1	0	0
8	1	0	0	0	1	1	0	0	0	0	0
9	1	0	0	1	1	1	0	0	0	0	0
10	1	0	1	0	1	1	0	0	1	0	0
11	1	0	1	1	1	1	0	0	1	0	0
12	1	1	0	0	0	1	1	0	0	0	0
13	1	1	0	1	0	1	1	0	0	0	0
14	1	1	1	0	0	1	1	0	1	1	1
15	1	1	1	1	0	1	1	1	1	1	1



$wx$		00		01		11		10	
$y_2$	00	0	0	0	4	0	0	0	12
	01	0	1	0	5	0	9	0	13
	11	0	3	0	7	1	11	0	15
	10	0	2	0	6	1	10	0	14

$wxy$

Simplified circuit is

