

LAB 3

Question 1.

$$F(X, Y, Z) = \sum m(0, 2, 5, 7)$$

X \ YZ	00	01	11	10
	0	1	3	2
0	1 ₀	0 ₁	0 ₃	1 ₂
1	0 ₄	1 ₅	1 ₇	0 ₆

SOP

Ident. $X=1$

comp. $X'=0$

$$\underline{F(X, Y, Z) = X'Z' + XZ}$$

$$G(A, B, C, D) = \sum m(1, 3, 4, 6, 9, 11, 12, 14)$$

AB \ CD	00	01	11	10
	0	1	3	2
00	0 ₀	1 ₁	1 ₃	0 ₂
01	1 ₄	0 ₅	0 ₇	1 ₆
11	1 ₁₂	0 ₁₃	0 ₁₅	1 ₁₄
10	0 ₈	1 ₉	1 ₁₁	0 ₁₀

SOP

Ident. $X=1$

comp. $X'=0$

$$G_1 = B' \cdot C' \cdot D \cdot CD = B'D$$

$$G_2 = B \cdot C'D' \cdot CD' = BD'$$

$$\underline{G(A, B, C, D) = B'D + BD'}$$

Question 2

$$H(X, Y, Z) = \prod M(0, 2, 6)$$

		Y ^z			
		00	01	11	10
X	G ₂	0	1	1	0
	0	0	1	1	0
	1	1	1	1	0
		4	5	7	6

POS

Ident. $x=0$

Compl. $x'=1$

$$G_1 = Y' + Z$$

$$G_2 = X + Z$$

$$\underline{H(X, Y, Z) = (Y' + Z)(X + Z)}$$

$$L(A, B, C, D) = \sum m(4, 6, 7, 15)$$

AB \ CD	00	01	11	10
00	0 ₀	0 ₁	0 ₃	0 ₂
01	1 ₄	0 ₅	1 ₇	1 ₆
11	0 ₁₂	0 ₁₃	1 ₁₅	0 ₁₄
10	0 ₈	0 ₉	0 ₁₁	0 ₁₀

G1: (0,0), (0,1), (0,3), (0,2)
 G2: (0,0), (0,1), (1,1), (1,0)
 G3: (0,0), (0,1), (1,1), (1,0)

POS

Ident. $x=0$

Compl. $x'=1$

$$G1 = B$$

$$G2 = A' + D$$

$$G3 = C + D'$$

$$\underline{L(A,B,C,D) = B(A' + D)(C + D')}$$

Question 3

$$F(W,X,Y,Z) = \sum m(0,1,2,3,7,8,10)$$

$$d_c(W,X,Y,Z) = \sum m(5,6,11,15)$$

1) for SOP form

wx \ yz	00	01	11	10
00	1 ₀	1 ₁	1 ₃	1 ₂
01		-	1 ₇	-
11			-	
10	1 ₈		-	1 ₁₀

SOP

Ident $x=1$

Comp $x'=0$

$$G_1 = X'Z' \quad G_2 = W'Z$$

$$\underline{F(W, X, Y, Z) = X'Z' + W'Z}$$

2) For POS

wx \ yz	00	01	11	10
00	1 ₀	1 ₁	1 ₃	1 ₂
01	0 ₄	-	1 ₇	-
11	0 ₁₂	0 ₁₃	-	0 ₁₄
10	1 ₈	0 ₉	-	1 ₁₀

for POS

Ident. $x=0$

Comp. $x'=1$

$$G_1 = X' + Z \quad G_2 = W' + Z'$$

$$\underline{F(W, X, Y, Z) = (X' + Z)(W' + Z')}$$

Question 4

$$F(W, X, Y, Z) = \sum m(0, 1, 2, 4, 7, 8, 10, 12)$$

W\YZ	00	01	11	10
00	1 ₀	1 ₁	0 ₃	1 ₂
01	1 ₄	0 ₅	1 ₇	0 ₆
11	1 ₁₂	0 ₁₃	0 ₁₅	0 ₁₄
10	1 ₈	0 ₉	0 ₁₁	1 ₁₀

for SOP

Ident. $x=1$

Compl. $x'=0$

Group 1: $X'Z'$

Group 2: $Y'Z'$

Group 3: $W'X'Y'$

Group 4: $W'XYZ$

$$\underline{F(W, X, Y, Z) = X'Z' + Y'Z' + W'X'Y' + W'XYZ}$$

Question 5

$$WXY' + WXZ' + WXZ + YZ'$$

$$WXZ' + WXZ = WX(Z + Z') = WX$$

$$WXY' + WX + YZ' \quad (\text{Absorpt.})$$

$$WX + YZ'$$

w	x	y	z	z'	wx	yz'	wx + yz'
0	0	0	0	1	0	0	0
0	0	0	1	0	0	0	0
0	0	1	0	1	0	1	1
0	0	1	1	0	0	0	0
0	1	0	0	1	0	0	0
0	1	0	1	0	0	0	0
0	1	1	0	1	0	1	1
0	1	1	1	0	0	0	0
1	0	0	0	1	0	0	0
1	0	0	1	0	0	0	0
1	0	1	0	1	0	1	1
1	0	1	1	0	0	0	0
1	1	0	0	1	1	0	1
1	1	0	1	0	1	0	1
1	1	1	0	1	1	1	1
1	1	1	1	0	1	0	1

Sum of Minterms

$$\sum m(2, 6, 10, 12, 13, 14, 15)$$

Product of Maxterms

$$\prod m(0, 1, 3, 4, 5, 7, 8, 9, 11)$$