

EEE 21 DC #5 (for Exam 2)

For the functions below,

- (a) Draw the K-map and simplify in SOP format
- (b) Draw the K-map and simplify in POS format
- (c) Derive the SOP from the derived POS

1. $F(A,B,C,D) = \Sigma m(0,2,3,4,6,15)$

a)

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

$F(A,B,C,D) = A'D' + A'B'C + ABCD$

which group correspond to which term?

b)

CD\AB	00	01	11	10
00			0	0
01	0	0	0	0
11		0		0
10			0	0

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

which group correspond to which term?

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

c)

$F(A,B,C,D) = (A' + B)(A' + D)(C + D')(A + B' + D')$
 $= (A' + BD)(AC + B'C + D')$
 $= A'B'C + A'D' + ABCD$

* same as derived in (a)

2. $X(M,N,O,P) = MO' + MP + N'OP + MO'P + MN' + M'N'OP'$

a)

OP\MN	00	01	11	10
00			1	1
01			1	1
11	1		1	1
10	1			1

OP\MN	00	01	11	10
00			1	1
01			1	1
11	1		1	1
10	1			1

$X(M,N,O,P) = MO' + MP + N'O$

b)

	MN			
OP	00	01	11	10
00	0	0		
01	0	0		
11		0		
10		0	0	

$$X(M,N,O,P) = (M + O)(M+N')(N'+O'+P)$$

c) $X(M,N,O,P) = (M + O)(M+N')(N'+O'+P)$
 $= (M + N'O)(N' + O' + P)$
 $= MN' + MO' + MP + N'O + N'OP$
 $= MN'(O + O') + MO' + MP + N'O(1 + P)$
 $= N'O(M + 1) + MO' + MP$
 $= MO' + MP + N'O$ (same as answer to a)

3. $F(A,B,C,D,E) = \sum m(0,2,3,4,6,16,19,20,22) + d(1,10,18,23,26)$

a)

	BC			
DE	00	01	11	10
00	m0	m4		
01	d1			
11	m3			
10	m2	m6		d10

A = 0

	BC			
DE	00	01	11	10
00	m16	m20		
01				
11	m19	d23		
10	d18	m22		d26

A = 1

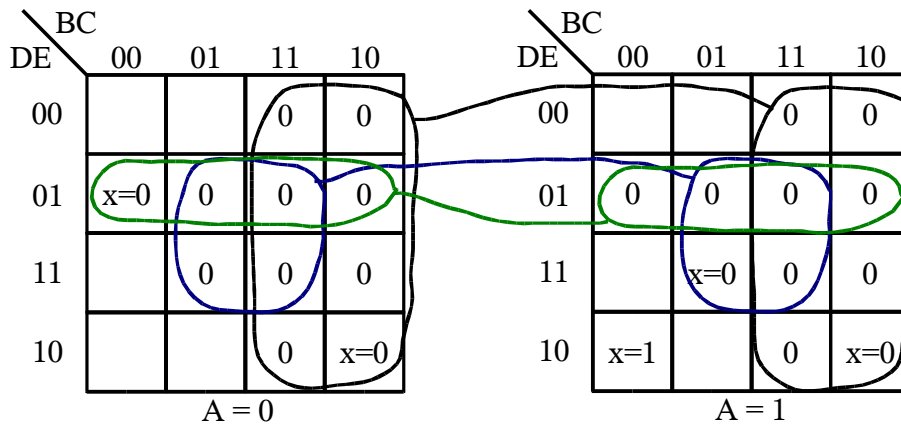
	BC			
DE	00	01	11	10
00	1	1		
01	x			
11	1			
10	1	1		x

A = 0

	BC			
DE	00	01	11	10
00	1	1		
01				
11	1	x		
10	x	1		x

A = 1

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



note: the x=0 and x=1 were set the moment we chose the mappings for SOP. We must observe the same values of x for deriving the SOP and POS to have consistent expressions.

$$\begin{aligned}
 F(A,B,C,D,E) &= B'(C'+E')(D+E') \\
 &= B'(C'D + E') \\
 &= B'C'D + B'E' \text{ (same as SOP form)}
 \end{aligned}$$