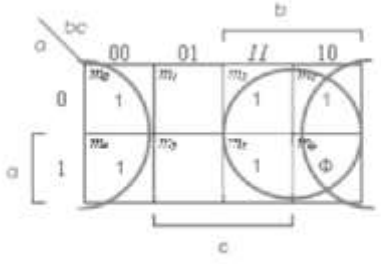
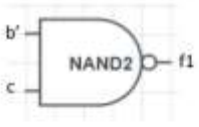
CSE 241 Digital Systems Homework 2

1. Problem 2.27 - Make a 3 variable K map for f1 and f2; minimize and implement using NAND only gates.

(a) f1 = b + c'

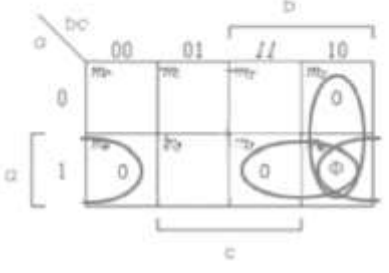


NAND gate Only

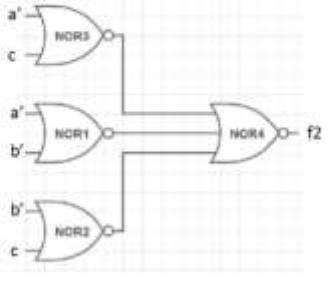


(b) f2' = ac' + ab + bc'

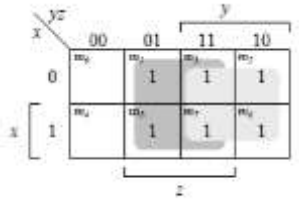
f2 = (a' + c)(a' + b')(b' + c)



Nor gate Only

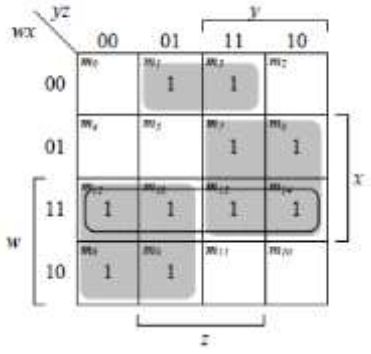


2. Problem 3.2 (d)

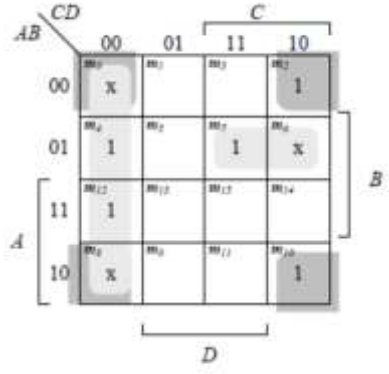


$F = y \cdot z$

3. Problem 3.9 (d)



4. Problem 3.15 (d)



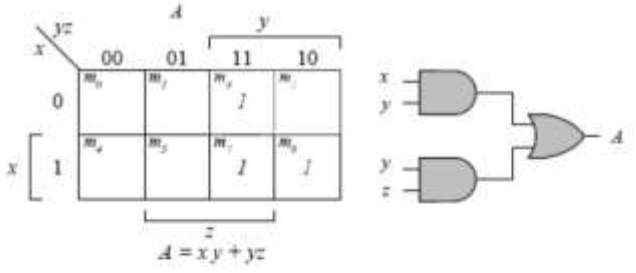
$F = B'D' + C'D' + A'BC$

$F = \quad F = \Sigma(0, 2, 4, 6, 7, 8, 10, 12)$

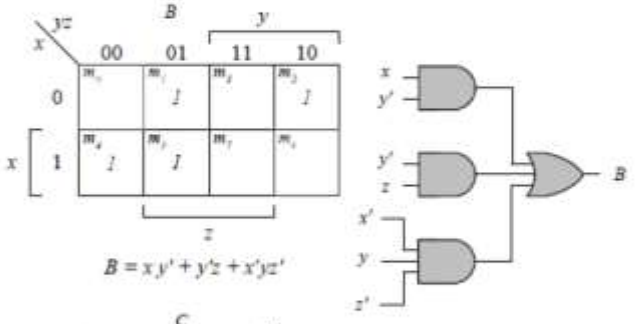
(Ignore the second part of the question and the answer)

5. Problem 4.5

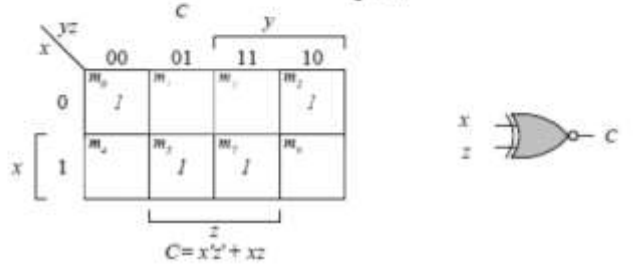
xyz	ABC
000	001
001	010
010	011
011	100
100	010
101	011
110	100
111	101



$A = xy + yz$

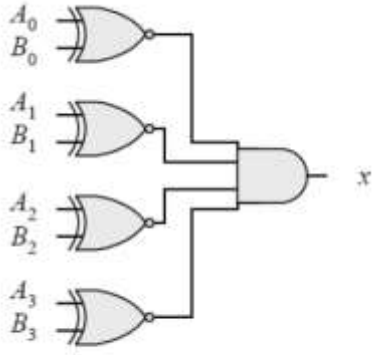


$B = xy' + y'z + x'yz'$



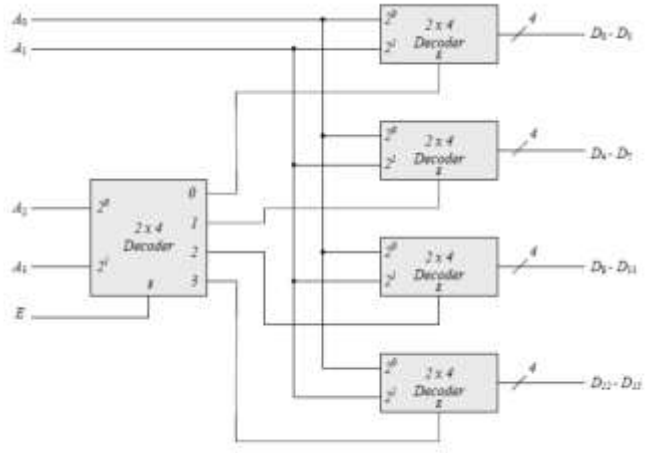
$C = x'z' + xz$

6. Problem 4.21



$x = (A_0 \oplus B_0)'(A_1 \oplus B_1)'(A_2 \oplus B_2)'(A_3 \oplus B_3)'$

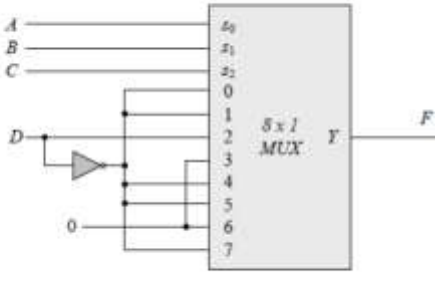
7. Problem 4.26



8. Problem 4.32

(a) $F = \Sigma(0, 2, 5, 8, 10, 14)$

Inputs ABCD	Mux input line (ABC)	Value	$F = \Sigma(0, 2, 5, 8, 10, 14)$
000 0	0	**0**	1 $F = D'$
000 1	0	1	0
001 0	1	**2**	1 $F = D'$
001 1	1	3	0
010 0	2	4	0 $F = D$
010 1	2	**5**	1
011 0	3	6	0 $F = 0$
011 1	3	7	0
100 0	4	**8**	1 $F = D'$
100 1	4	9	0
101 0	5	**10**	1 $F = D'$
101 1	5	11	0
110 0	6	12	0 $F = 0$
110 1	6	13	0
111 0	7	**14**	1 $F = D'$
111 1	7	15	0



b)

$F = \Pi(2, 6, 11) = (A' + B' + C + D')(A' + B + C + D')(A + B' + C + D)$

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

$F' = (ABC'D) + (AB'C'D) + (A'BC'D') = \Sigma(13, 9, 4)$

$F = \Sigma(0, 1, 2, 3, 5, 6, 7, 8, 10, 11, 12, 14, 15)$

Inputs ABCD	Mux input line (ABC)	Value	
000 0	0	**0**	$^{1}F = 1$
000 1	0	**1**	1
001 0	1	**2**	$^{1}F = 1$
001 1	1	**3**	1
010 0	2	4	$^{0}F = D$
010 1	2	**5**	1
011 0	3	**6**	$^{1}F = 1$
011 1	3	**7**	1
100 0	4	**8**	$^{1}F = D'$
100 1	4	9	0
101 0	5	**10**	$^{1}F = 1$
101 1	5	**11**	1
110 0	6	**12**	$^{1}F = D'$
110 1	6	13	0
111 0	7	**14**	$^{1}F = 1$
111 1	7	**15**	1