Module 3: Logic Minimization
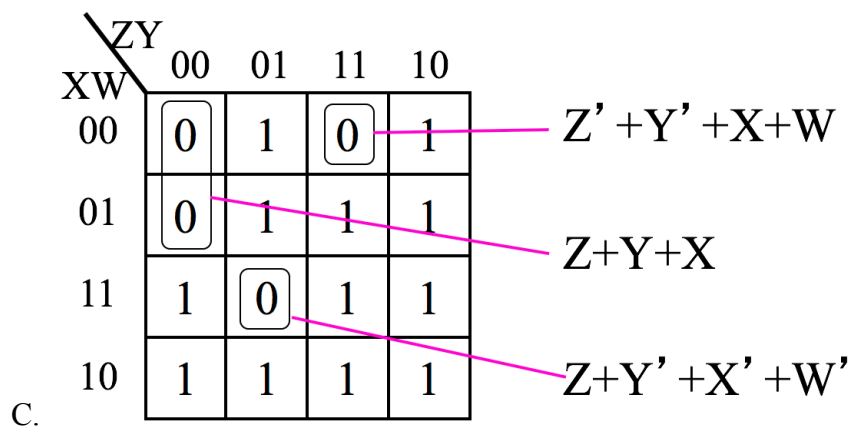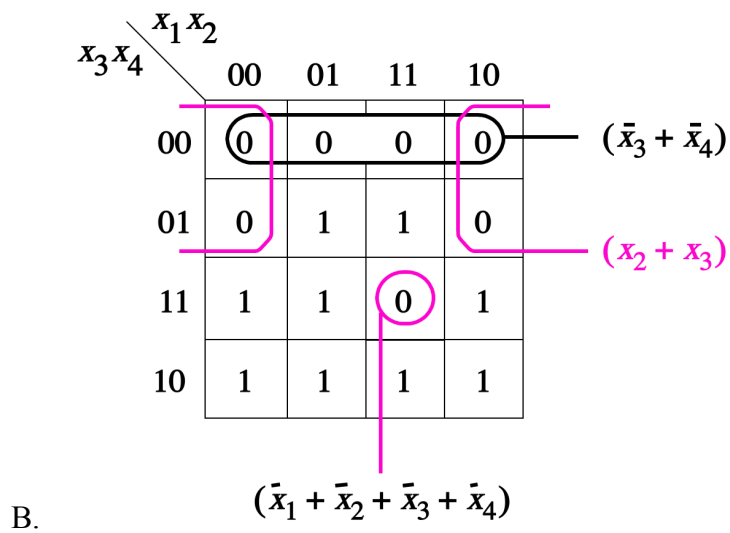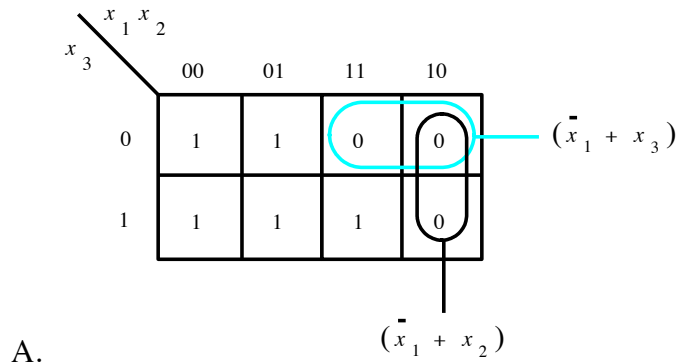## *Class 11: Minimization of POS Forms*
tRAT & AA
(4 questions in total)

1. Which of the following statements about logic minimization is correct?

    A. The cost of the minimum-cost POS implementation of a logic function is always *less than* that of the minimum-cost SOP implementation of the same logic function.

    B. The cost of the minimum-cost POS implementation of a logic function is always *greater than* that of the minimum-cost SOP implementation of the same logic function.

    C. The cost of the minimum-cost POS implementation of a logic function is always *equal to* that of the minimum-cost SOP implementation of the same logic function.

    D. None of the above.

2. Which of the following has an incorrect interpretation of the Karnaugh map?

A.

x_3 \ $x_1 x_2$	00	01	11	10	
0	1	1	0	0	$(\bar{x}_1 + x_3)$
1	1	1	1	0	

$(\bar{x}_1 + x_2)$

B.

$x_3 x_4$ \ $x_1 x_2$	00	01	11	10	
00	0	0	0	0	$(\bar{x}_3 + \bar{x}_4)$
01	0	1	1	0	$(x_2 + x_3)$
11	1	1	0	1	
10	1	1	1	1	

$(\bar{x}_1 + \bar{x}_2 + \bar{x}_3 + \bar{x}_4)$

C.

XW \ ZY	00	01	11	10	
00	0	1	0	1	Z′ +Y′ +X+W
01	0	1	1	1	Z+Y+X
11	1	0	1	1	
10	1	1	1	1	Z+Y′ +X′ +W′

3. A four-input *minority* function is a function with 4 inputs such that the output is 1 iff the number of 1's is less than or equal to the number of 0's in the input variables. Write the truth table for this minority function. Use K-map to derive the simplest POS expression for this minority function. Assuming that the complements of input variables are readily available at zero cost, what is the cost of the logic circuit represented by this expression?

    A. 18
    B. 19
    C. 20
    D. 21
    E. 22
    F. 23

4. Consider the minority function defined in Question 3 above. Simplify the minority function by K-map using the SOP form. Assuming that the complements of input variables are readily available at zero cost, what is the cost of this expression?

    A. 22
    B. 23
    C. 24
    D. 25
    E. 26
    F. 27