

MT1 ECE2060 Sol Sp 2022

Show all relevant steps. Don't just write down the answers.

Submit your answers in Word or pdf format to Carmen. Write all your answers on the provided assignment. You can add your own pages to the assignment if you run out of space.

Do not email directly to your TAs or me. Files emailed directly to the TAs or me will not be accepted. Fill out the following

Please provide the following information:

Your Last Name_____ Your First Name_____

OSU email _____

Problem 1 (30 points): Express the Boolean function, $F(X, Y, Z) = Z' + XY'$, as

- a sum of Minterms (25 points)
- a product of Maxterms (5 points)

	X	Y	Z	$\bar{Z} + X\bar{Y}$
m_0	0	0	0	1
m_1	0	0	1	0
m_2	0	1	0	1
m_3	0	1	1	0
m_4	1	0	0	1
m_5	1	0	1	1
m_6	1	1	0	1
m_7	1	1	1	0

$$F = \sum m(0, 2, 4, 5, 6)$$

$$F = \prod M(1, 3, 7)$$

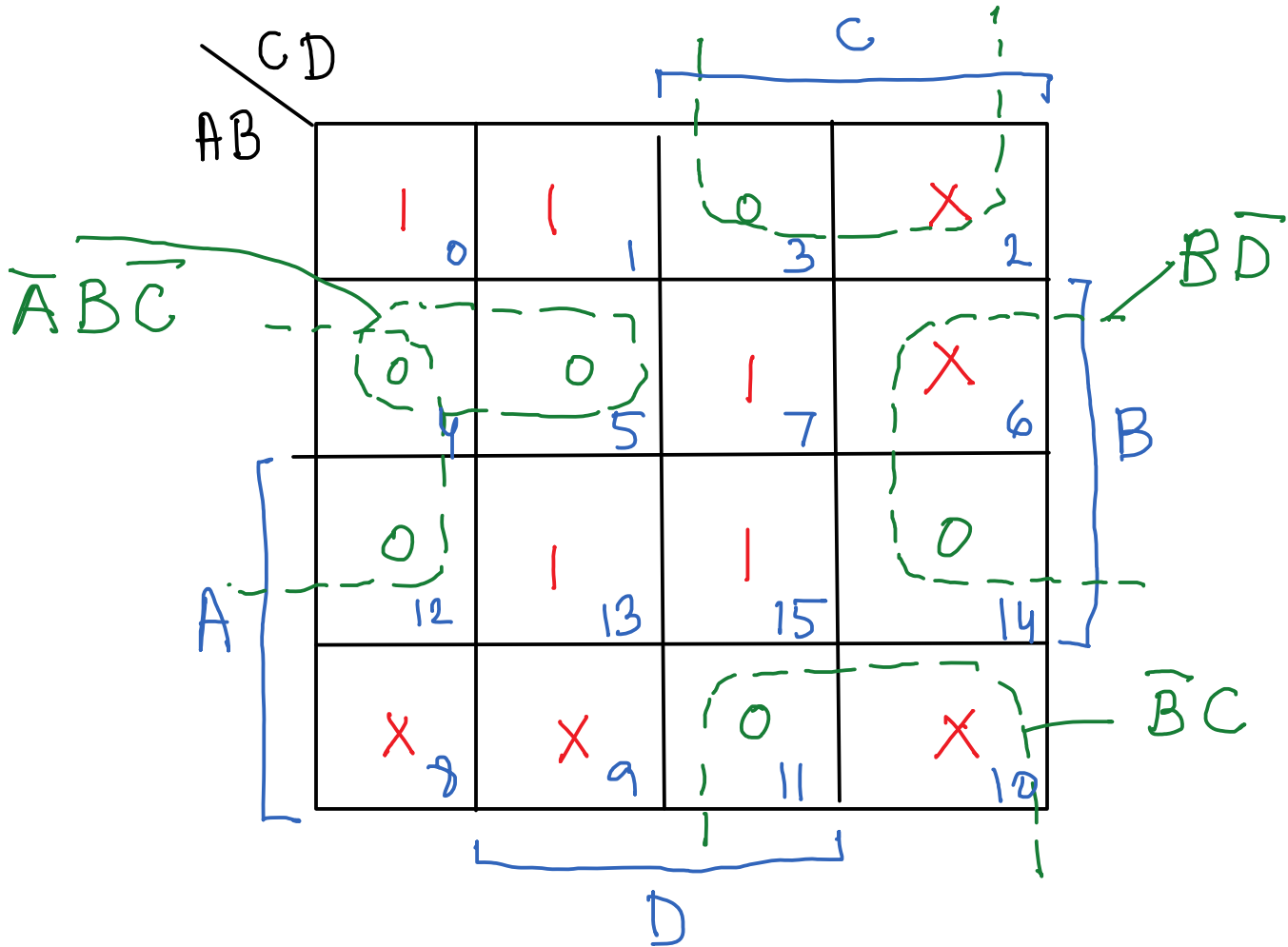
Space for Problem 1 solution

Problem 2 (30 points): Consider the Boolean function F along with the don't-care condition d :

$$F(A,B,C,D) = \sum m(0, 1, 7, 13, 15)$$

$$d(A,B,C,D) = \sum m(2, 6, 8, 9, 10)$$

- Optimize (simplify) F together with the don't-care condition d as a *product of sums* using a K-map (20 points)
- Draw the circuit diagram of the optimized function (10 points)

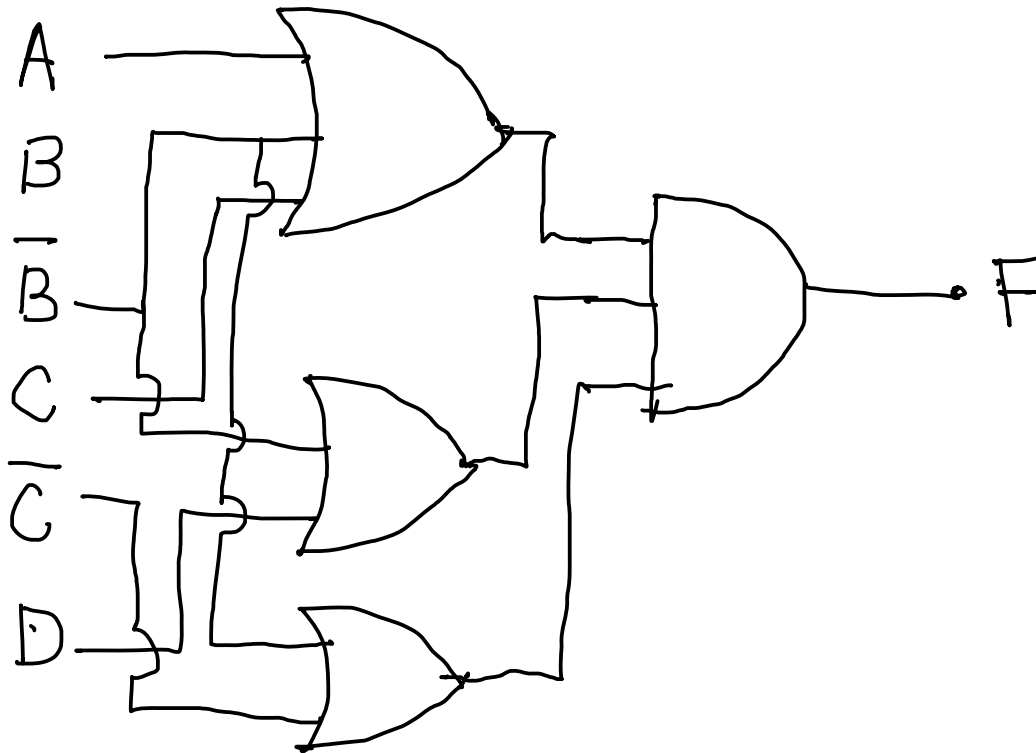


$$F = \bar{A}B\bar{C} + B\bar{D} + \bar{B}C$$

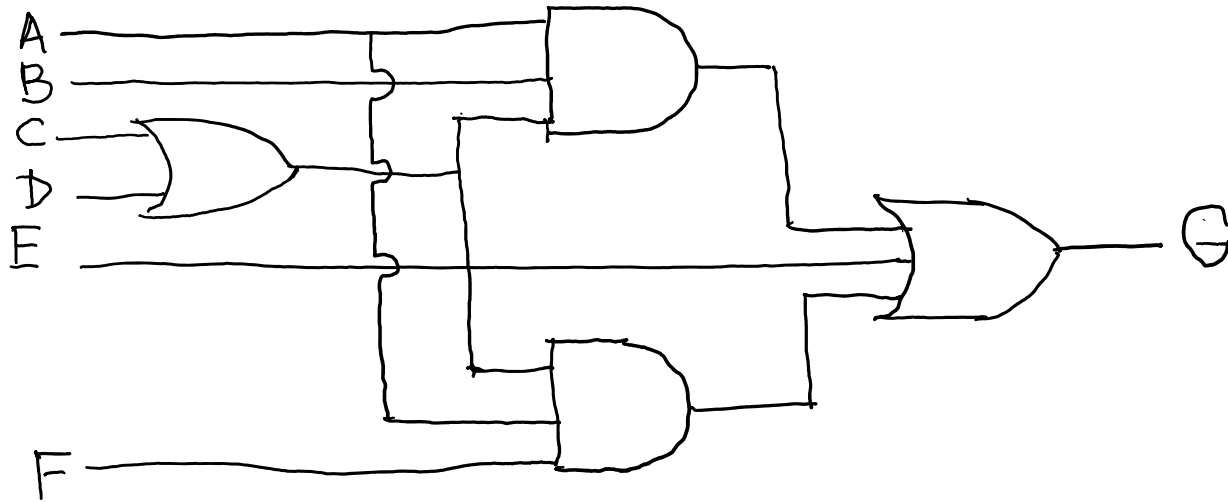
$$F = (A + \bar{B} + C)(\bar{B} + D)(B + \bar{C})$$

Space for Problem 2 solution

$$F = (A + \bar{B} + C)(\bar{B} + D)(B + \bar{C})$$

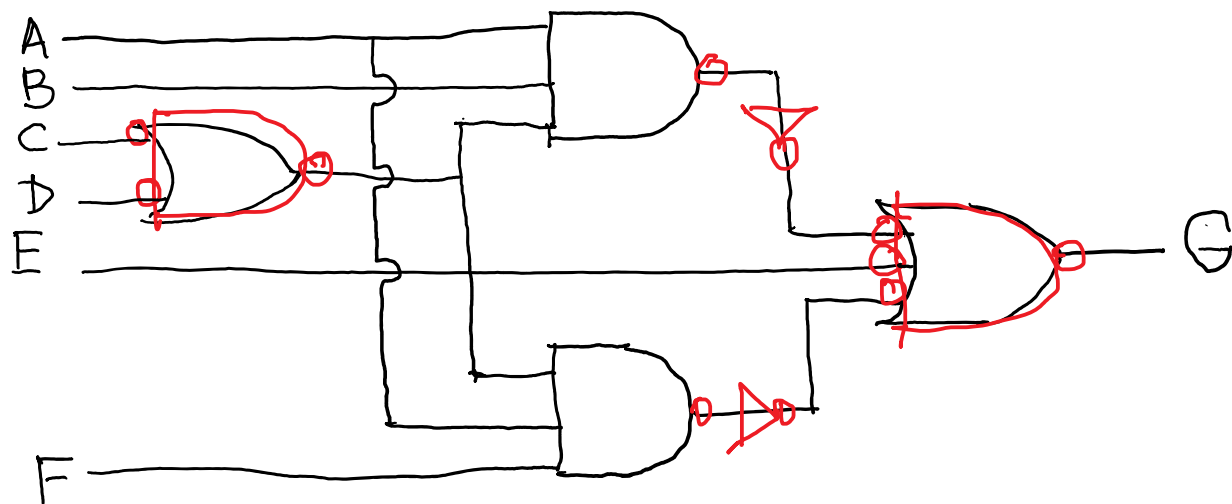


Problem 3 (40 points): Consider the Boolean function $G(A, B, C, D, E, F)$:

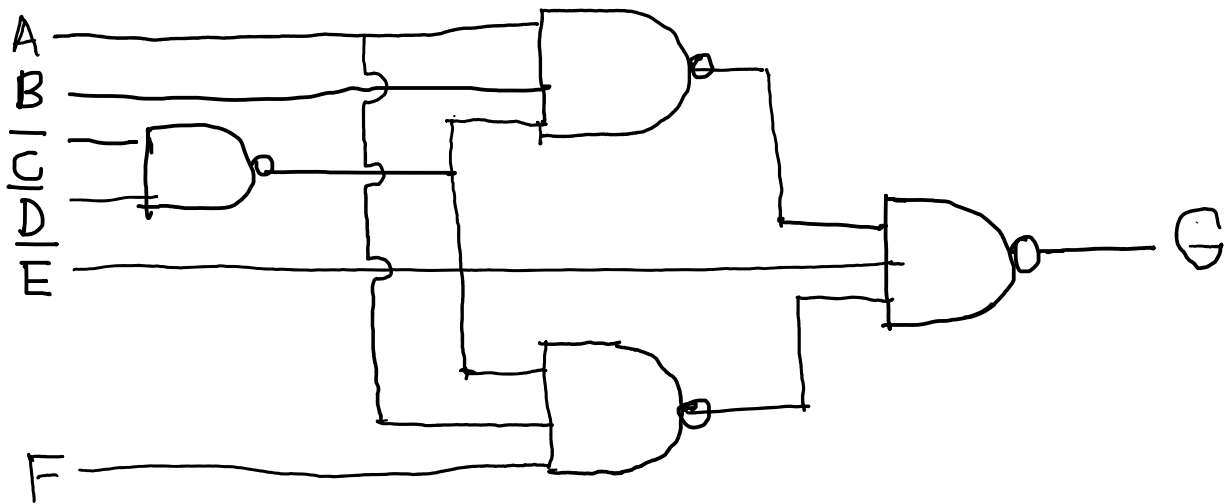
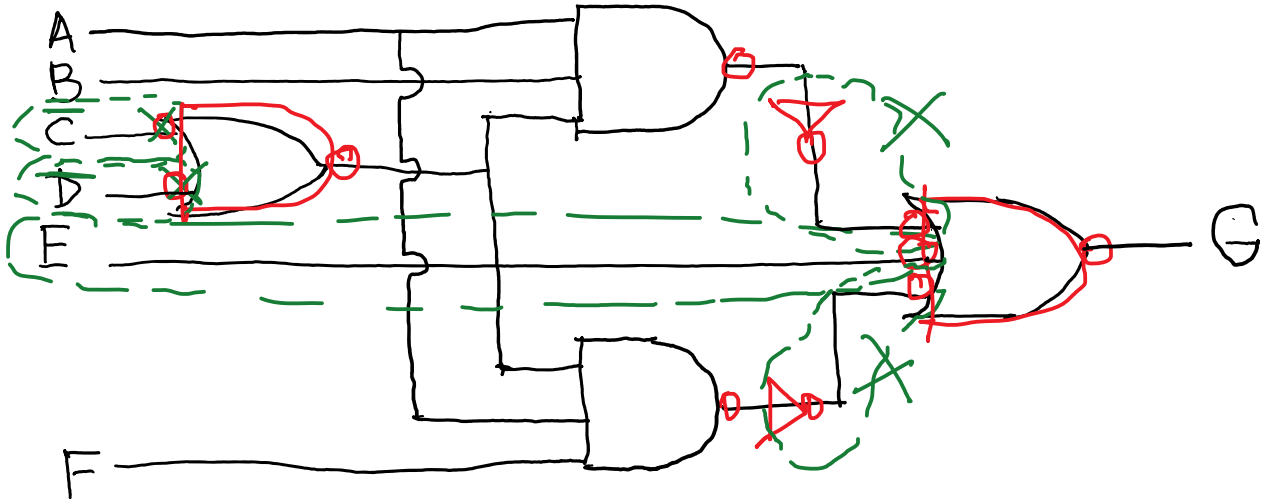


- Implement G with NAND gates (show the circuit) (20 points)
- Implement G with NOR gates (show the circuit) (20 points)

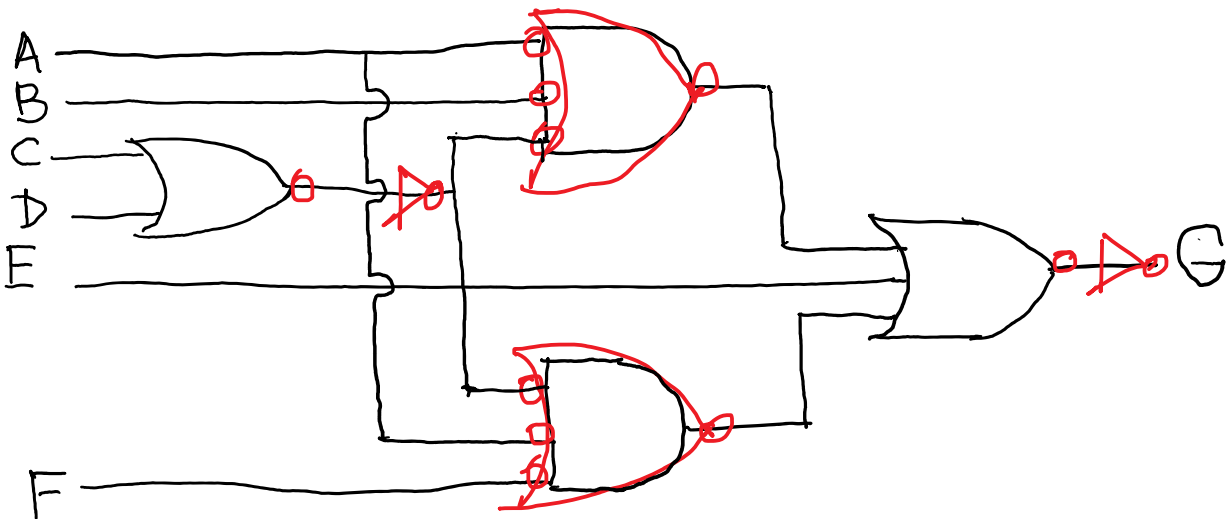
Minimize the use of NOT gates, but you **can** use NOT gates if they cannot be avoided in this problem.



Space for Problem 3 solution



b)



Space for Problem 3 solution

