

GIT
DEPARTMENT OF
COMPUTER ENGINEERING
CSE 232 - Spring 2021



HOMEWORK

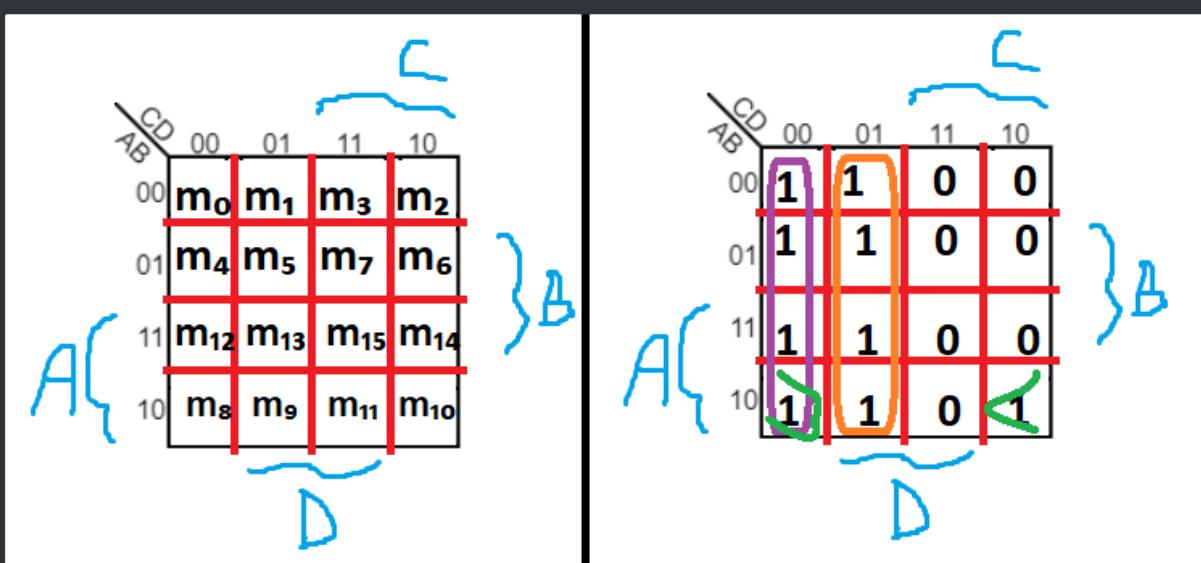
GIT / CSE 232 - HW2

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QUESTION 1

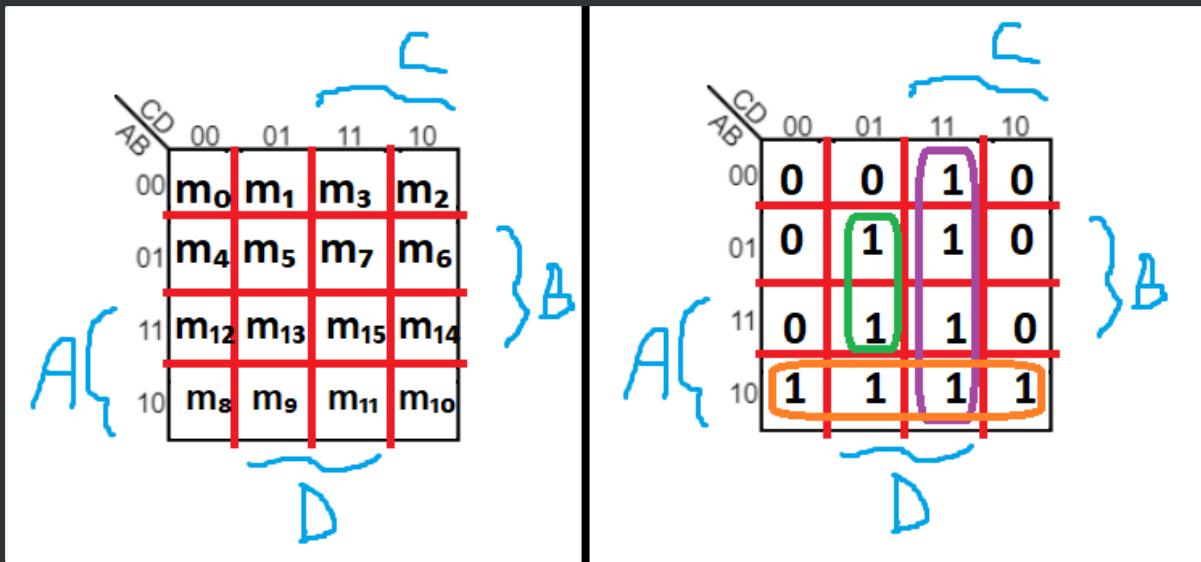
1) Simplify the following Boolean functions by using Karnaugh map method.

a) $F_1(A, B, C, D) = \sum m(0, 1, 4, 5, 8, 9, 10, 12, 13)$



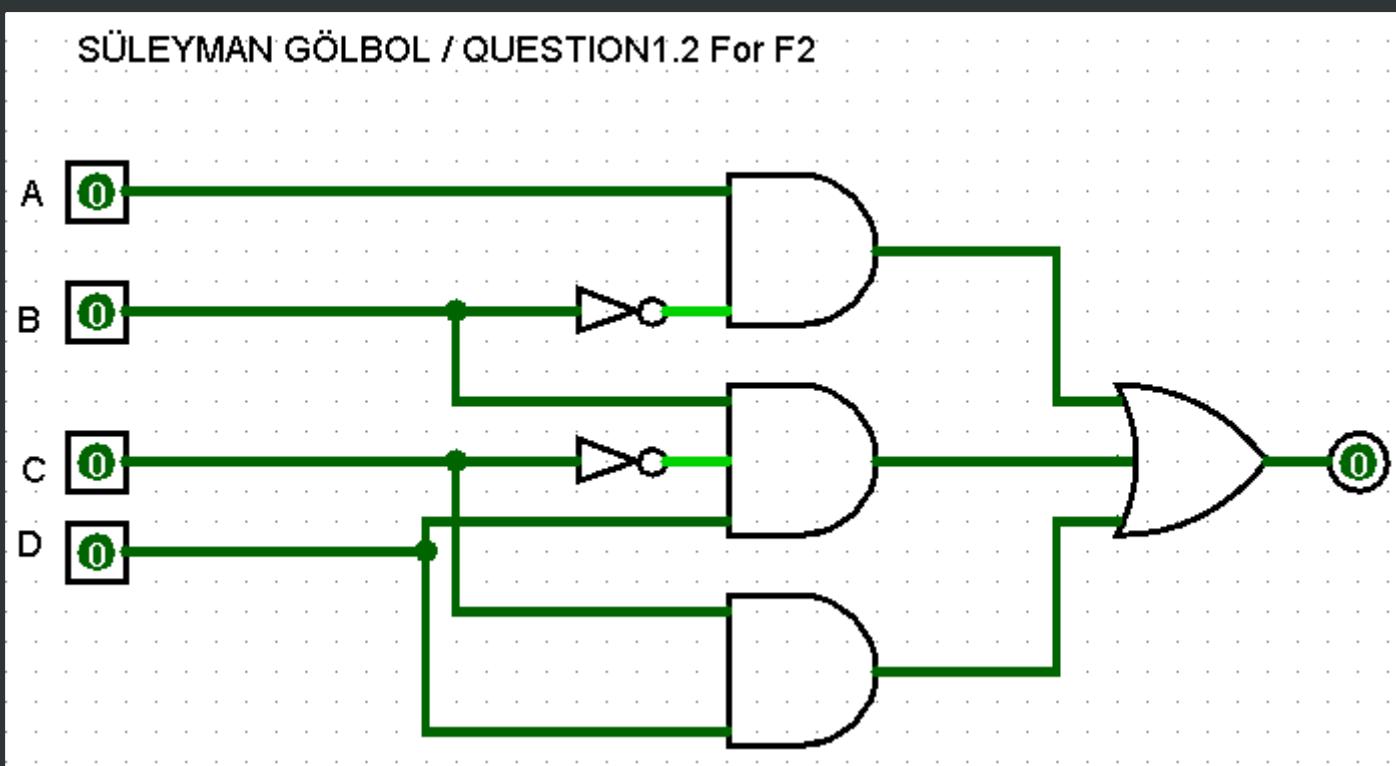
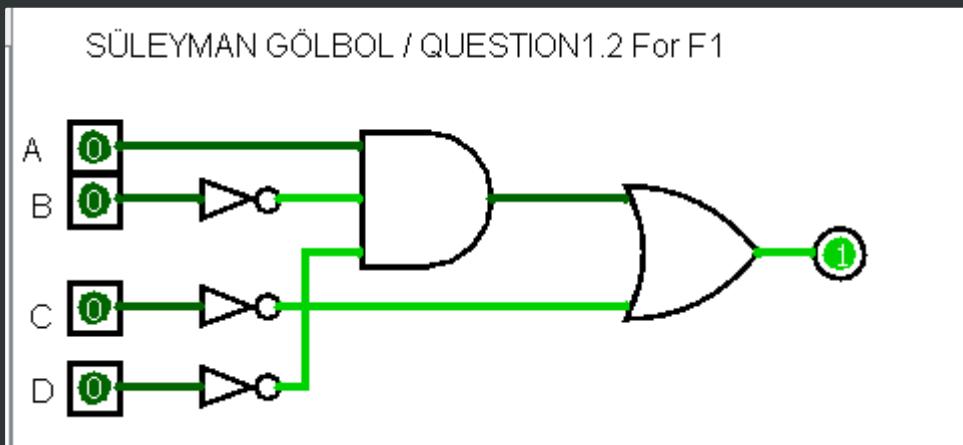
$$(C'D') + (CD) + (AB')(CC'D'D') = C'D' + C'D + AB'D' = C'(D' + D) + AB'D' = C' + AB'D'$$

$$b) F_2(A, B, C, D) = \sum m(3, 5, 7, 8, 9, 10, 11, 13, 15)$$

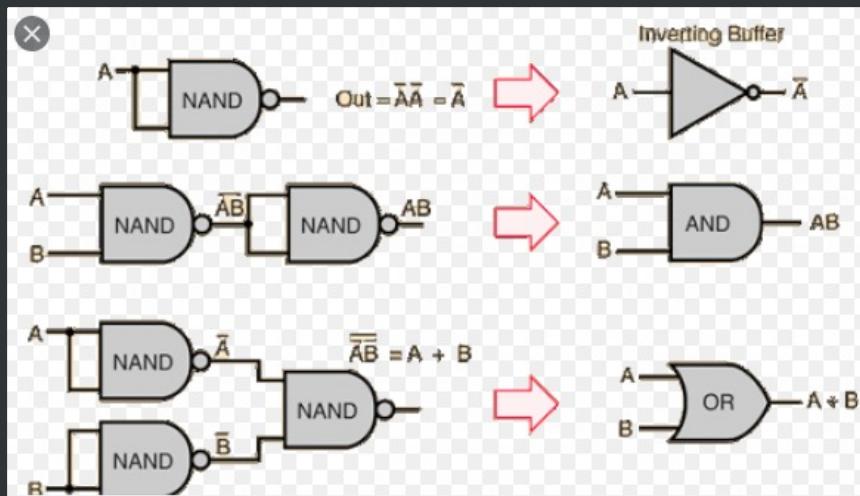


$$(CD) + (AB') + (AA'BB)(C'D) = CD + AB' + BC'D = D(C+BC') + AB'$$

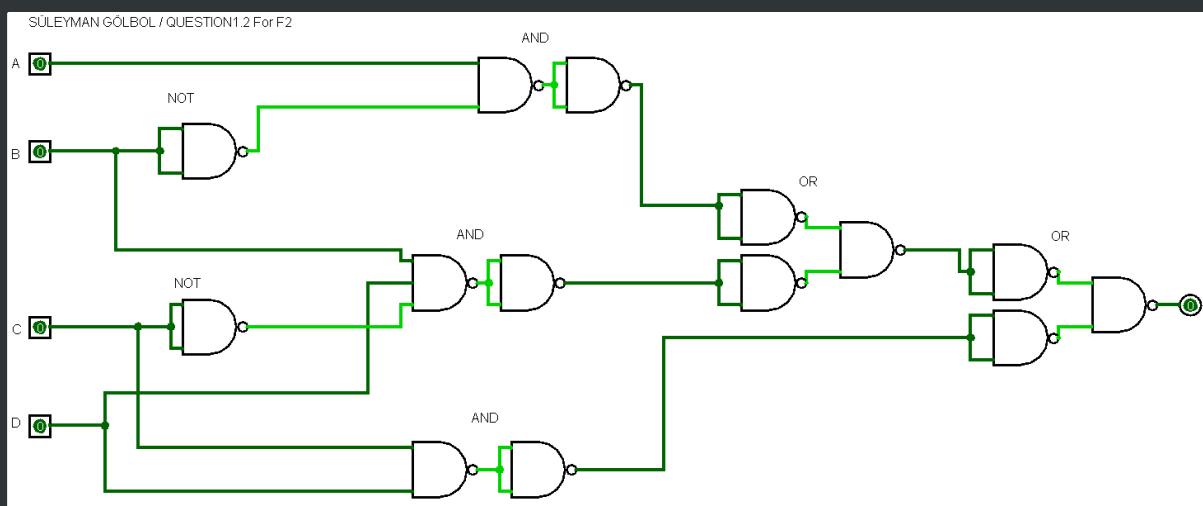
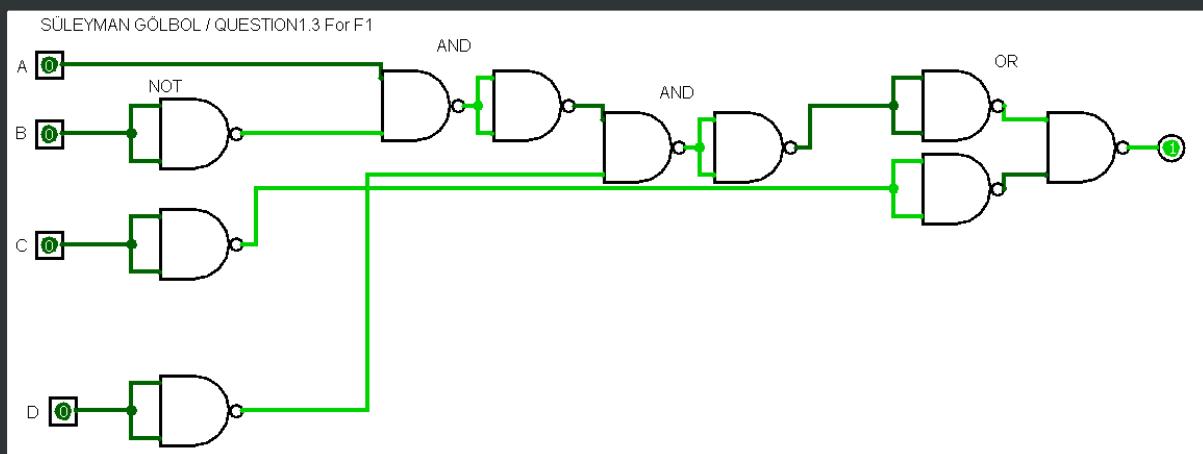
2) Design logic circuits of F_1 and F_2 for A, B, C and D inputs.



3) Design Logic circuits of F_1 and F_2 by using only NAND gates as few as possible.



To convert NAND gates, I used formula above.



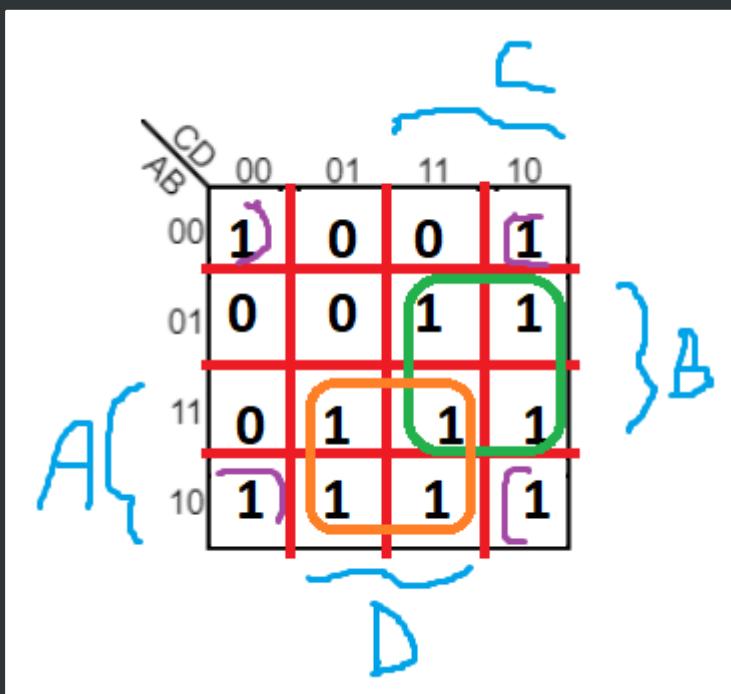
QUESTION 2

1) Write the truth table that provides the following Boolean function.

$$F = AB' + AD + BC + CD' + A'B'C'D'$$

A	B	C	D	F
0	0	0	0	1
0	0	0	1	0
0	0	1	0	0
0	0	1	1	0
0	1	0	0	0
0	1	0	1	0
0	1	1	0	1
0	1	1	1	1
1	0	0	0	1
1	0	0	1	1
1	0	1	0	1
1	0	1	1	1
1	1	0	0	0
1	1	0	1	1
1	1	1	0	1
1	1	1	1	1

2) Write the Karnaugh map of the truth table.



$$(AA'B'B')(CC'D'D')(AABB')(CC'DD')(AA'BB)(CCDD') = B'D' + AD + BC$$

3) Group all 1's on the Karnaugh map to obtain simplified F function

$$F = B'D' + AD + BC$$

4) Group all 0's on the Karnaugh map to obtain simplified F' function.

CD
AB

	00	01	11	10
00	1	0	0	1
01	0	0	1	1
11	0	1	1	1
10	1	1	1	1

A { } D } B

$$(A'B')(CC'DD)(A'B)(C'C'DD') = A'B'D' + A'BC' = A'(B'D' + BC')$$

5) Design the circuits of F and F' functions by using NAND gates.

