post-Lab

Experiment No. 1 - Combinational Logic Circuits.

*Student name: Abdulrahman shaheen.

* ID#: 1211753.

* Instructor Name: Dr. Qadri Mayyala

* Date: 4/5/2023.

* Section: 2.

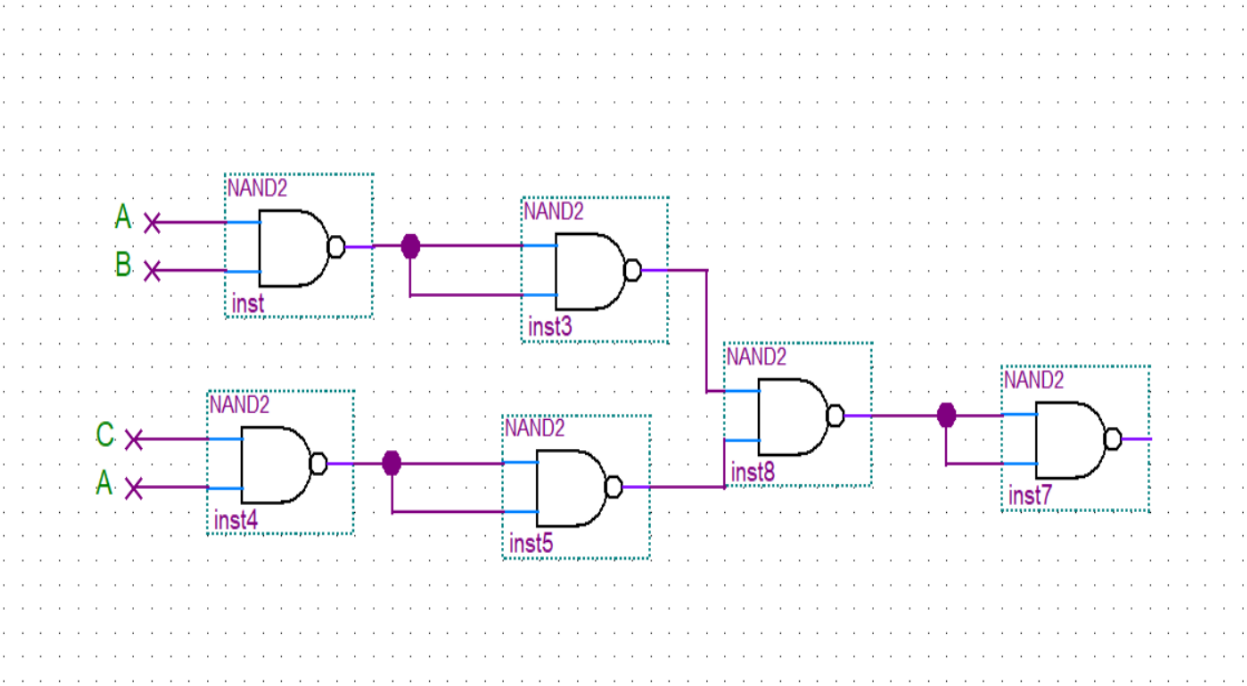
Q1: Draw the logic diagram showing the implementation of the following Boolean equation using “NAND” gates

a) F = AB (CA).

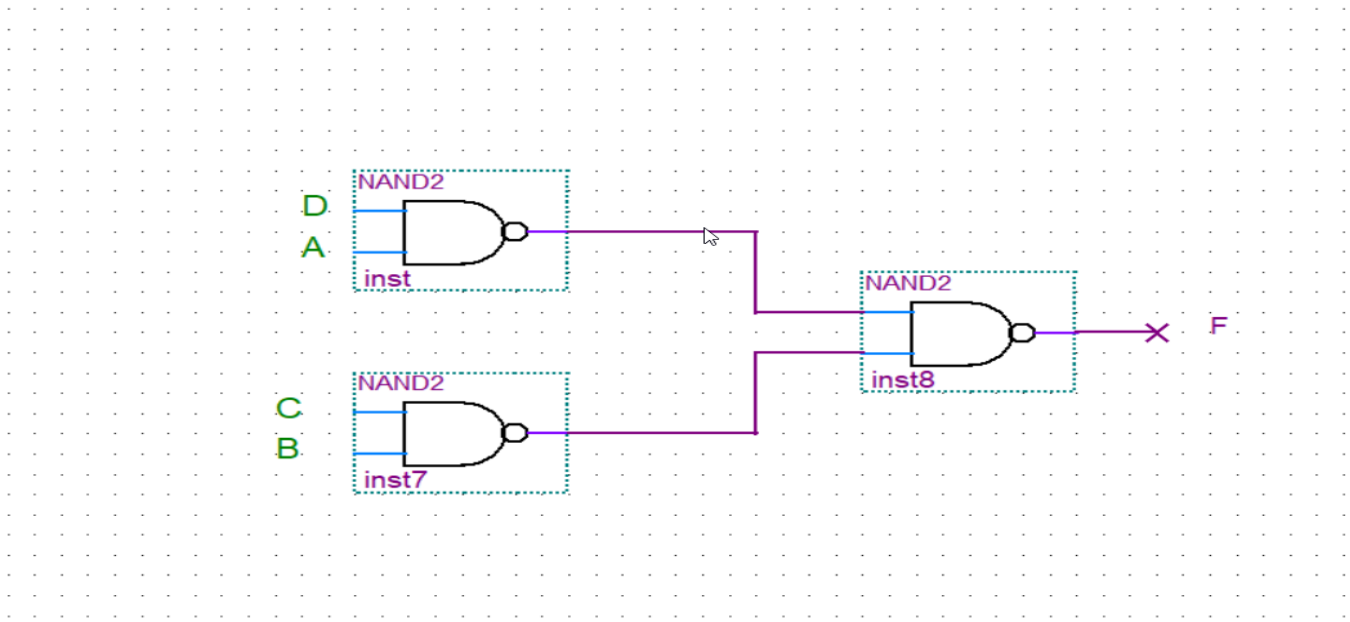
b) F= (D.A) + (C.B)

c) F = XZ + Y’Z + X’YZ

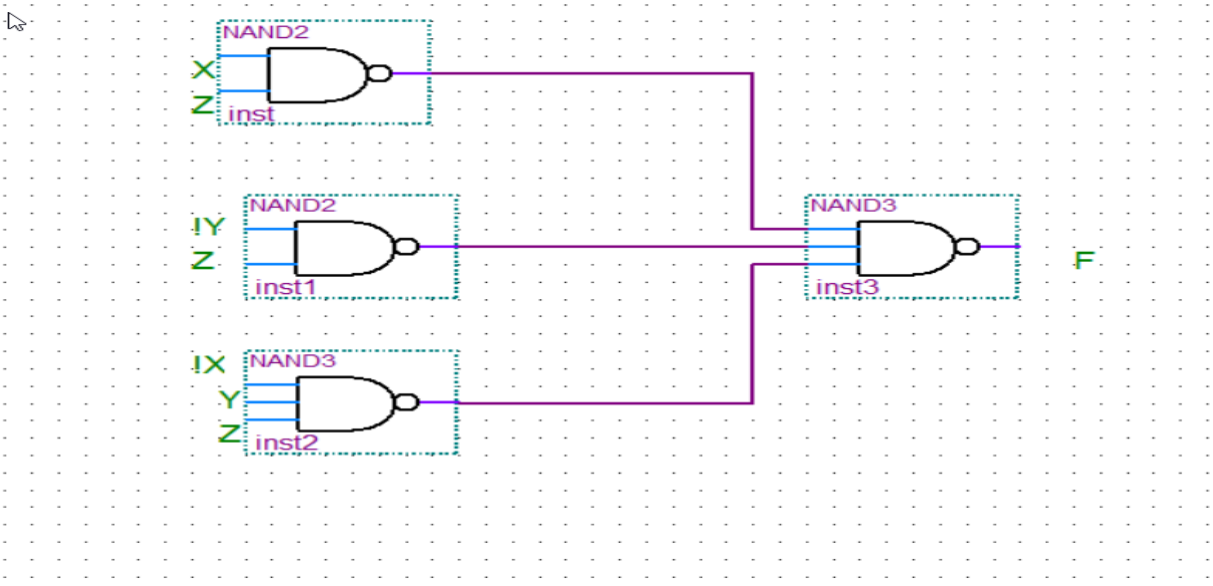
a)



b)


NAND2
D
A
inst
NAND2
C
B
inst7
NAND2
inst8
F

C)


NAND2
X
Z
inst
NAND2
!Y
Z
inst1
NAND3
!X
Y
Z
inst2
NAND3
inst3
F

Q2:

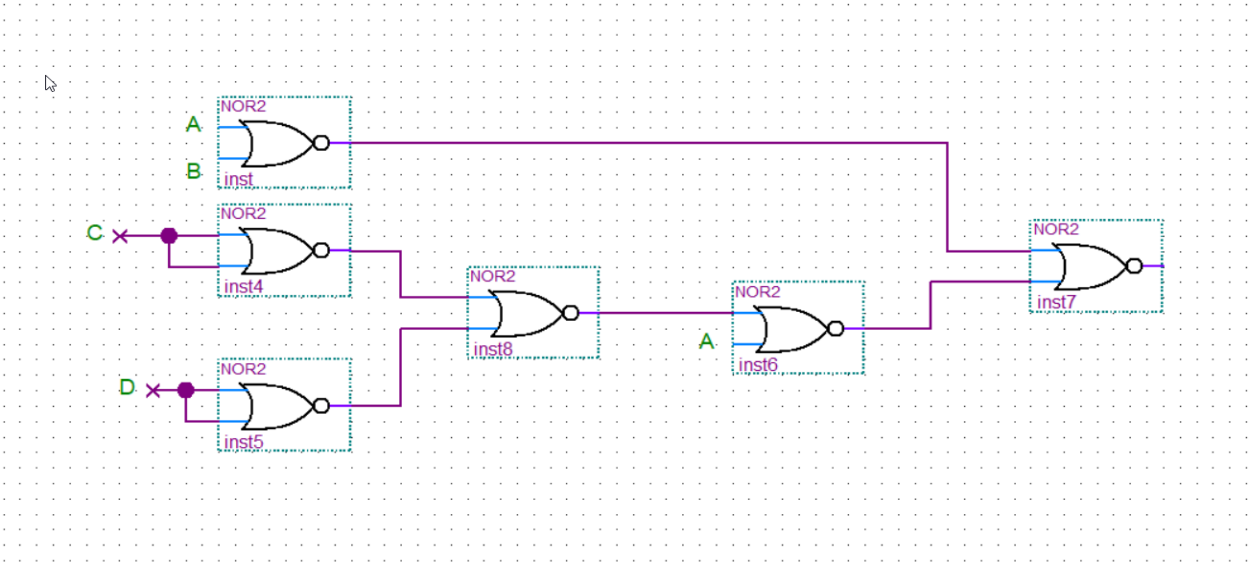
Draw the logic diagram of the following Boolean equations using NOR gates.

a) F=(A+B) (CD+A)

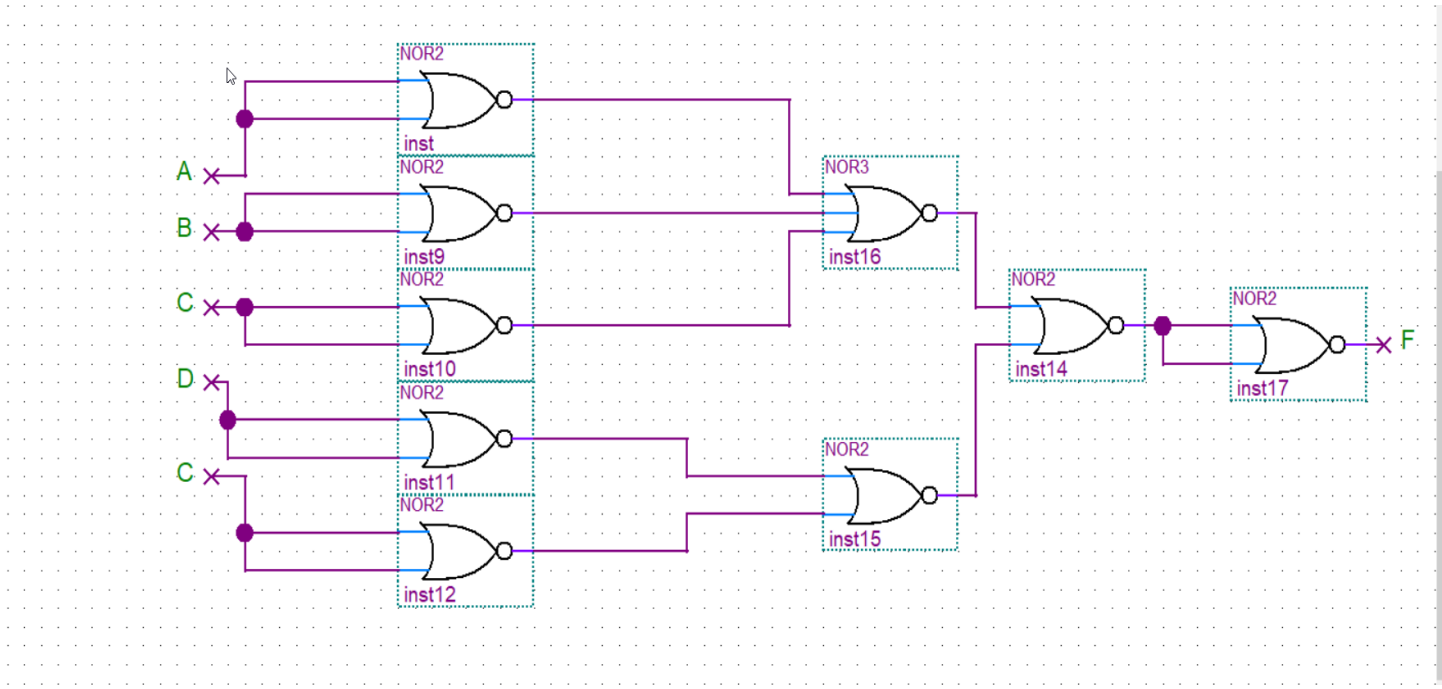
b) F= (ABC+D) C

c) F = (X+Z) (Y'+Z) (X'+Y+Z)

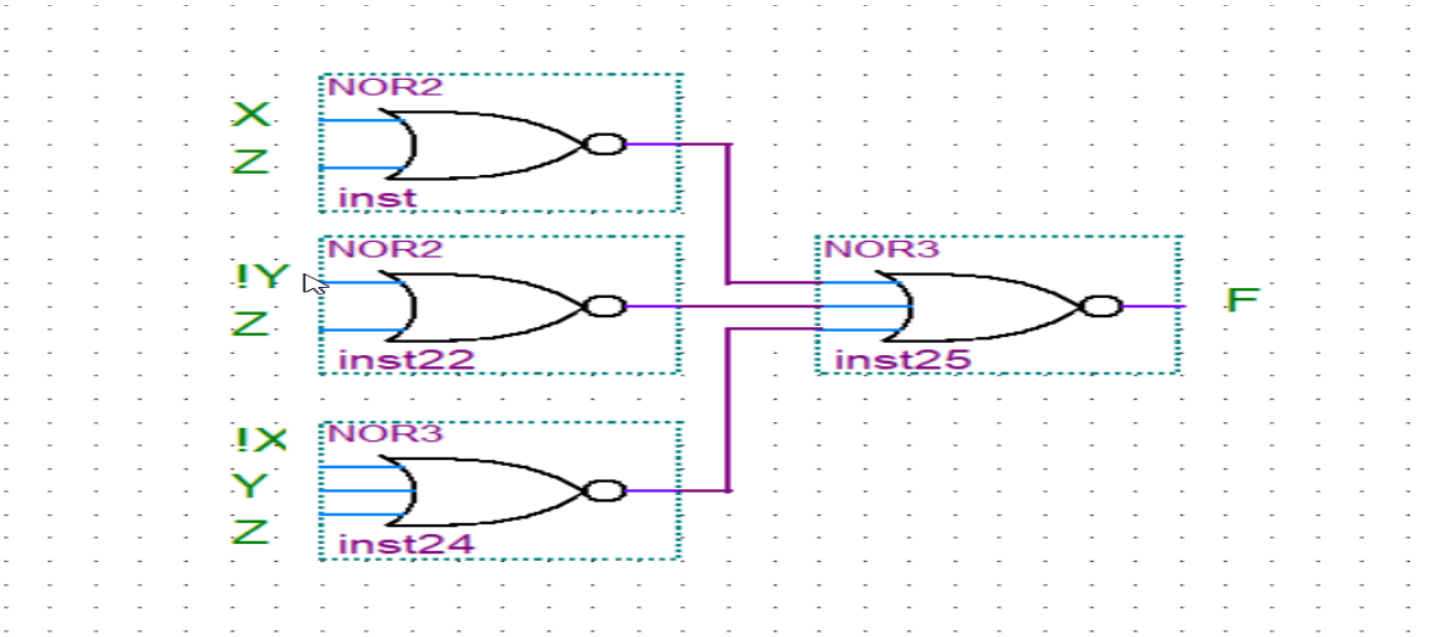
a)



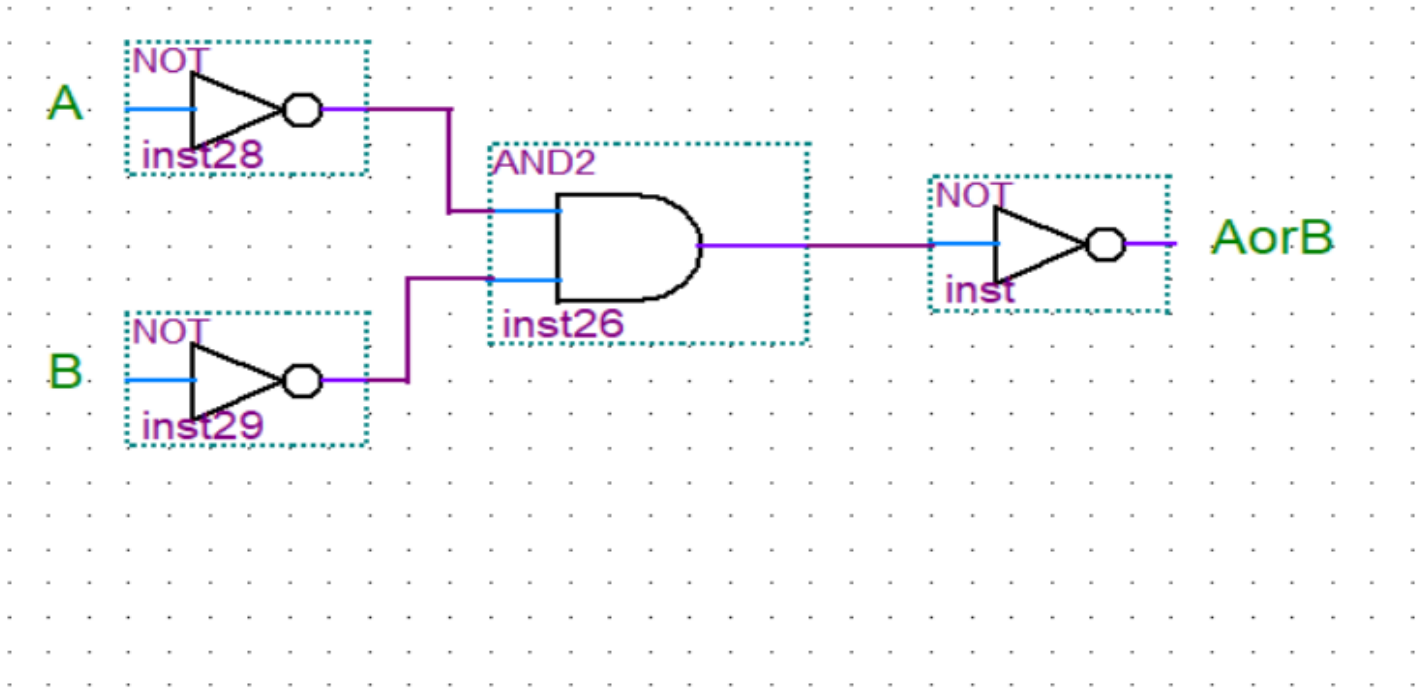
b)


NOR2
inst
A
NOR2
inst9
B
NOR2
inst10
C
NOR2
inst11
D
C
NOR2
inst12
NOR3
inst16
NOR2
inst15
NOR2
inst14
NOR2
inst17
F

C)


X
Z
NOR2
inst
!Y
Z
NOR2
inst22
!X
Y
Z
NOR3
inst24
NOR3
inst25
F

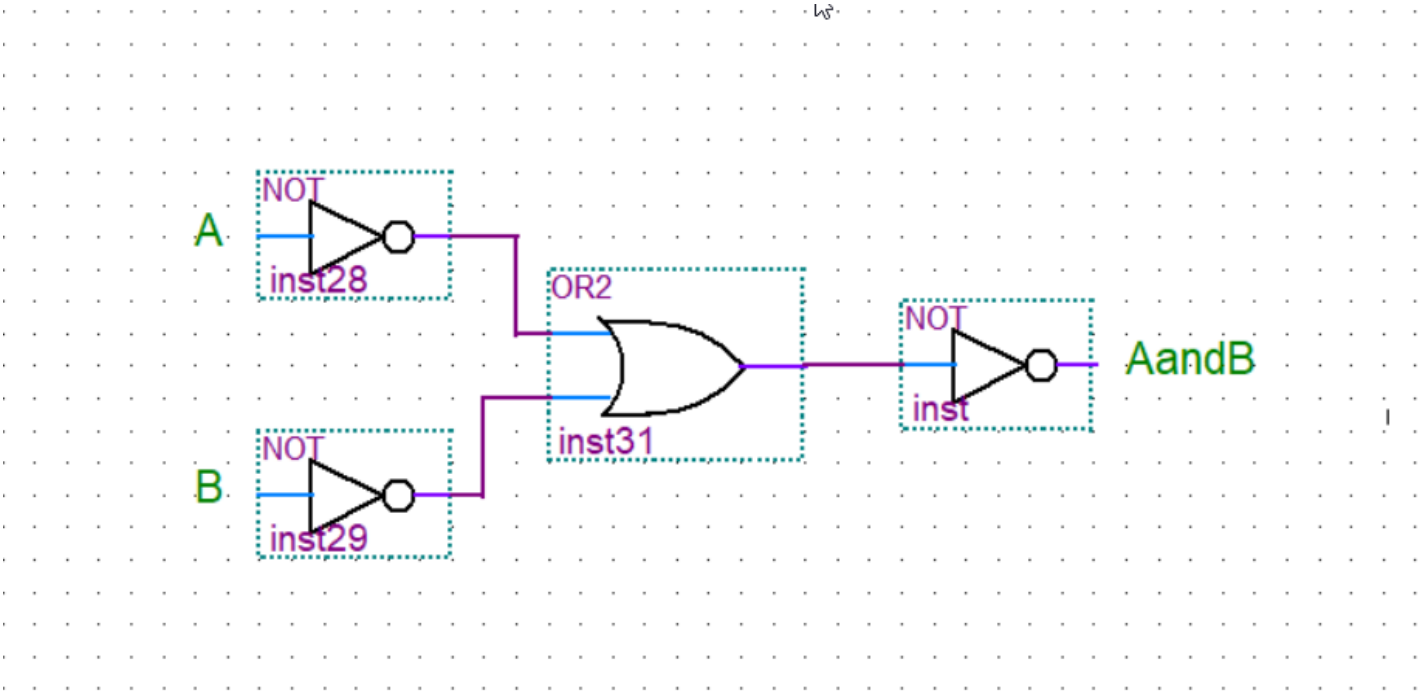
Q3) Implement the OR operation using AND, NOT gate. Draw the logic diagram and write the Boolean equation.



A OR B = !(!A and !B)

A+B=!(!A.!B)

Q4) Implement the AND gate using OR, NOT gate. Draw the logic diagram and write the Boolean equation.



A and B = !(!A or !B)

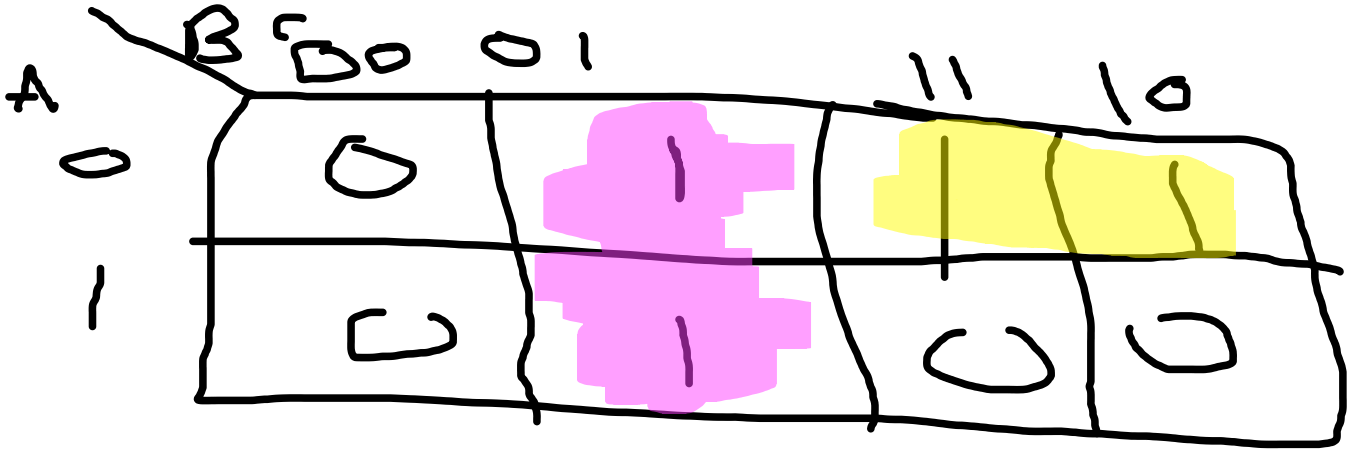
A.B=!(!A+!B)

Q5) Prove that the equality operation Fl =AB+A’B’ is the inverse of exclusive OR operation F2=AB’+A’B (use Demerger’s theorem).

(ab+a’b’)’=(a’+b’).(a+b)= ab’+bb’+aa’+a’b=ab’+a’b=xor

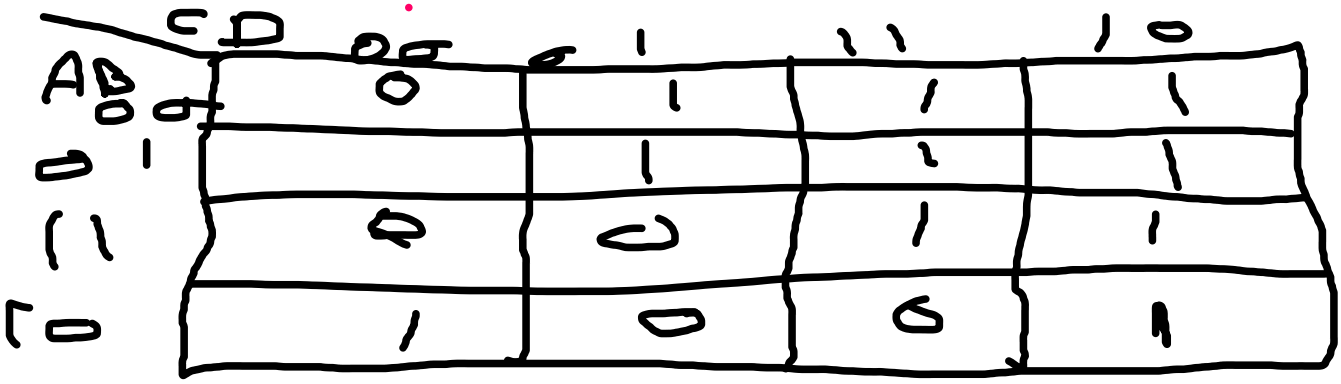
Q6) Show how is it possible to reduce Boolean expressions using the Karnaugh map:

N1)



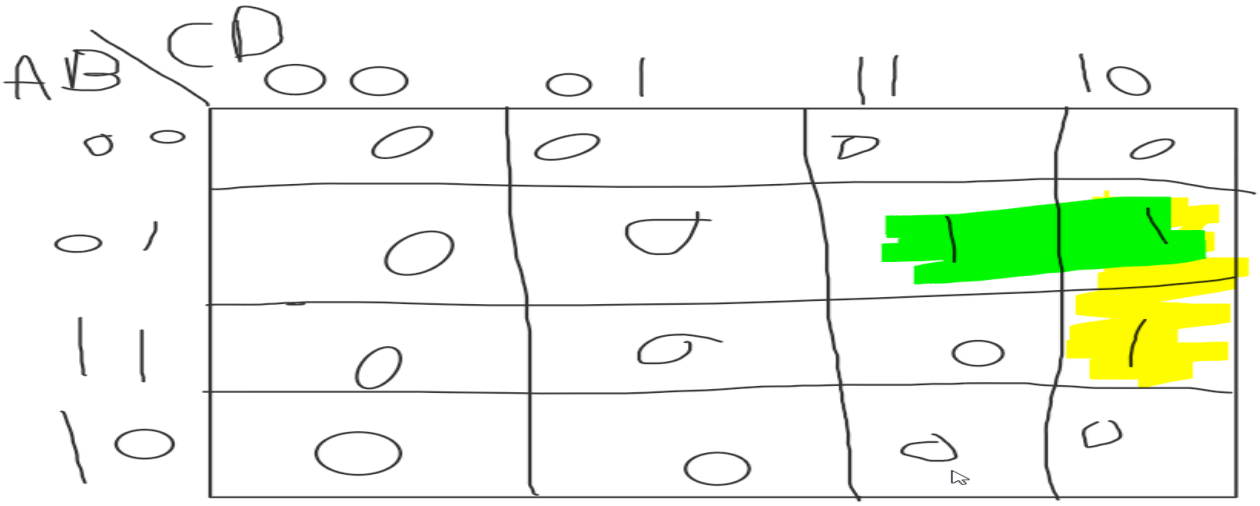
B'C+A’B

N2)



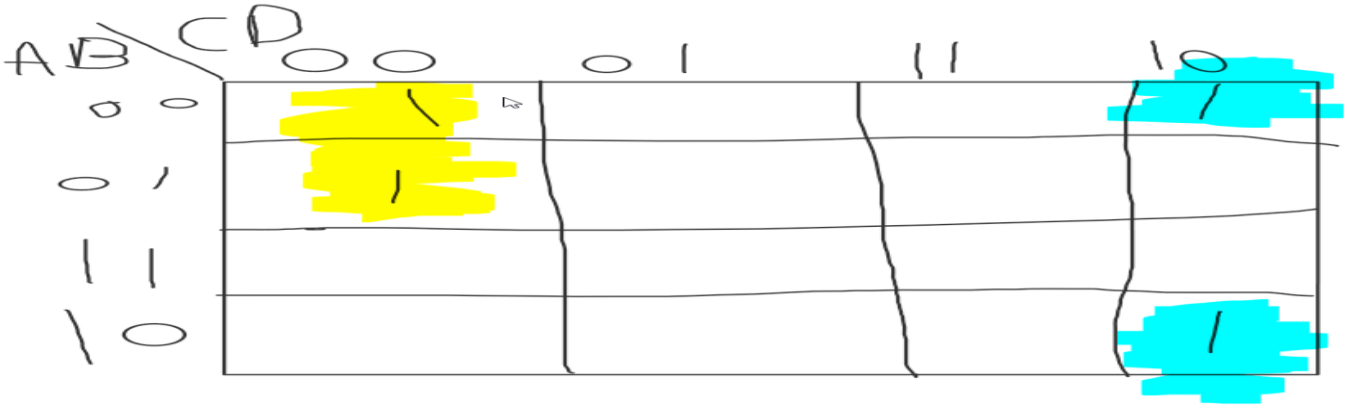
You can’t reduce it more.

N3)



A’BC+BCD’

N4)



A’C’D’+B’C’D’