SUBJECT: .... / /

First exam Fall 2018

problem 1. solve the following short problems

[A] If $(212)_z = (38)_{10}$ then $z = ...$

⇒ لو معطينا شي غير ال decimal ع اليمين بنحول الطرفين لـ decimal

$2*z^0 + 1*z + 2*z^2 = 38$

$2z^2 + z + 2 = 38$

$2z^2 + z - 36 = 0$

$z = 4$ or $\frac{-9}{2}$ → this is ignored.

answer is $z = 4$

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[B] $(7706)_8$ is equal to $(3F18)_{16}$

↓

00111 111 - 00011000

↓ ↓ ↓ ↓

3 F 1 8

[C] $(73)_{10}$ is equal to $(243)_5$

$73/5$ 3

↓

$14/5$ 4

$2/5$ 2

0

D $(1293)_{10}$ is equal to $(0001001010010011)_{BCD}$

0001 0010 1001 0011

E dual expression for function

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

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

F simplified complement expression for

$F(A,B,C) = \overline{A+C} + \bar{A} \cdot C$

dual $F = \overline{A \cdot C} \cdot (\bar{A} + C)$

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

then simplify

وممكن بطريقة السهل

⇓

K-map

(الحل في الصفحة التالية)

but for better answer

$F(A,B,C) = \bar{A}\bar{C} + \bar{A}C$ → first simplify (F)

$= \bar{A}(\bar{C} + C)$

$= \bar{A}$ → then $\bar{F} = A$

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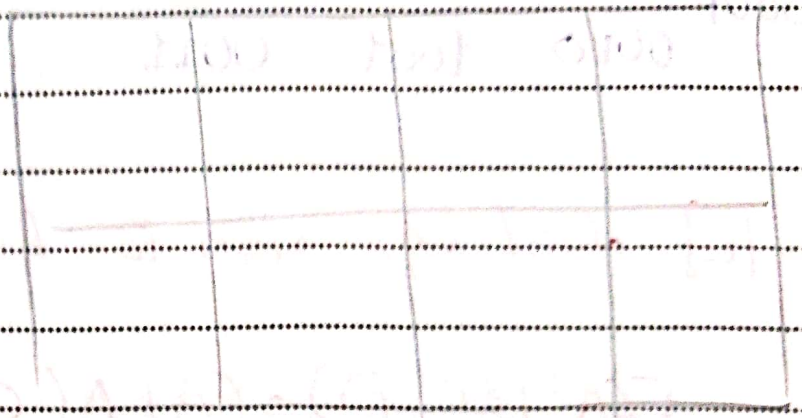
$F(A,B,C) = \overline{A}+C + \overline{A}\cdot C = \overline{A}\cdot\overline{C} + \overline{A}\cdot C$

الطريقة الثانية هي
K-map



[G1] Assume N is a 3-digit number represented in octal, minimum number of digits needed when N in decimal is ( )?

octal (radix 8) → 3 digits.

$8^3 = 512$ combinations to reach the maximum possible combination of 3 digits $(N = 777)_8$

so $\log_{10} 512 = 2.7$

so you need 3 digits.

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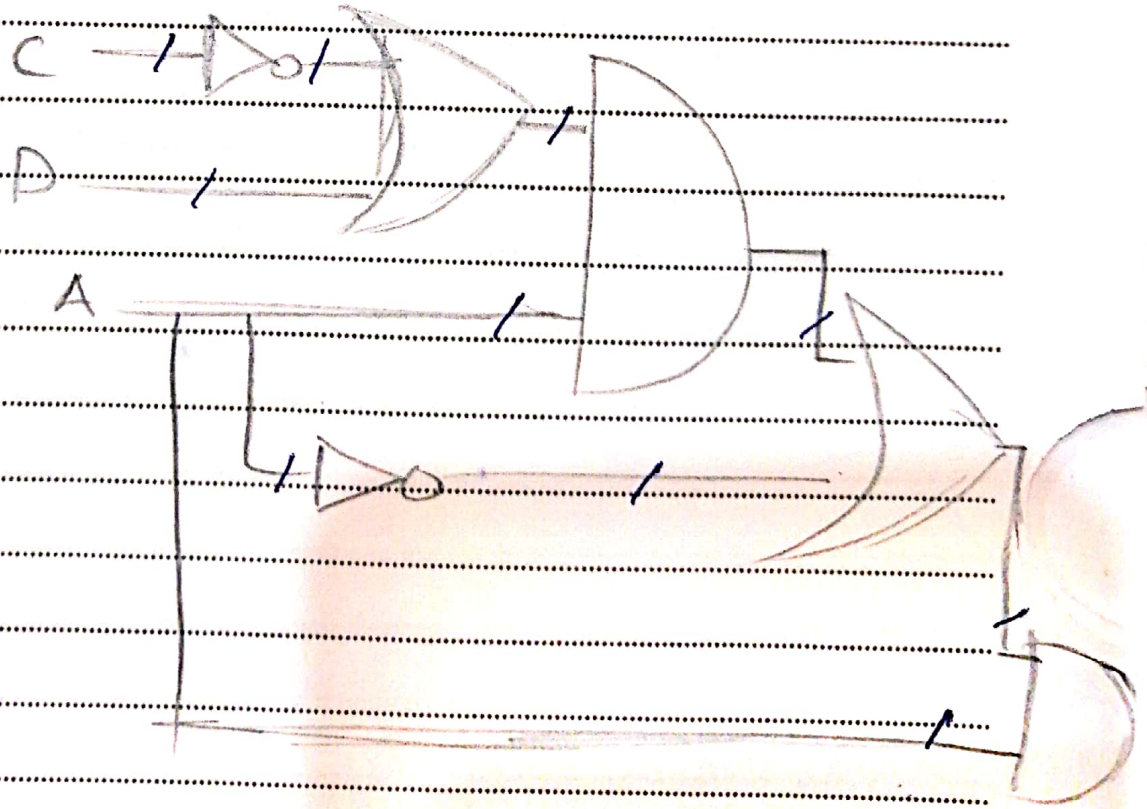
[H] The even parity bit for the following $(1100110011110111)_2$ code word is: 1

[I] The gate input cost with inverters count of $F(A,B,C,D) = (\bar{A} + A(\bar{C}+D)).A$ is:

GN: (10)

دائماً ارسم اوضح



[J] Given $F(A,B,C) = \sum_m (1,4,5) + \sum_d (0,6)$

Then $\bar{F}(A,B,C)$?

0, 1, 2, 3, 4, 5, 6, 7

$\bar{F}(A,B,C) = \prod_M (1,4,5) + \sum_d (0,6)$

⇓

ها نفسهم لأنه هما هون M
وطالبها كـ POM فبضلوا نفسهم .
بس بكون عارف انه قيمتهم (0)

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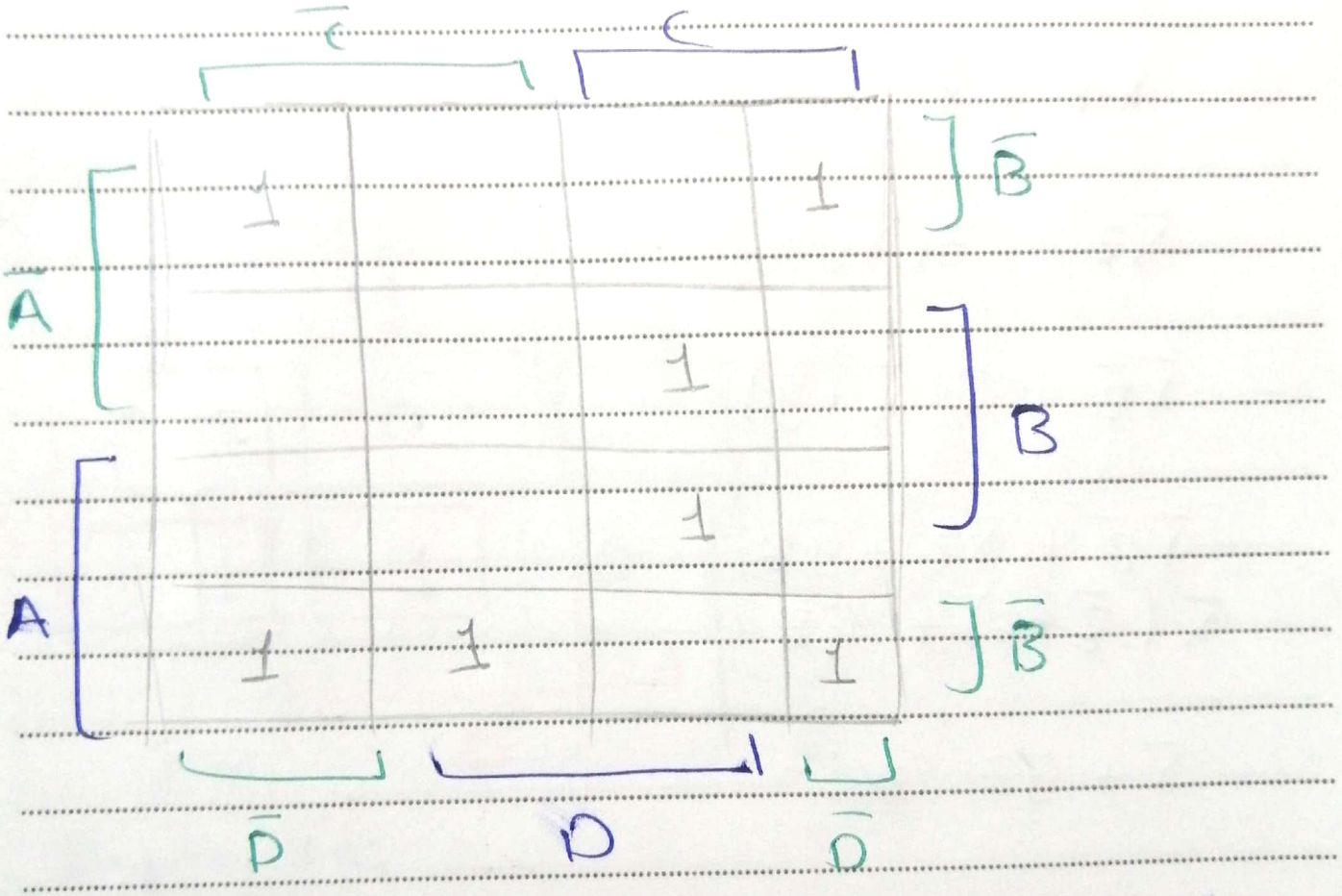
Problem 2:

Fill-in the following k-map for function.

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



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Problem 3 use boolean algebra only, prove that:

$$\overline{x+z} + \bar{x}yz + \bar{y}z = \bar{x} + \bar{y}z$$

$$\bar{x}\cdot\bar{z} + \bar{x}yz + \bar{y}z =$$

$$\bar{x}\bar{z} + z(\bar{x}y + \bar{y}) =$$

$$\bar{x}\bar{z} + z(\bar{x} + \bar{y}) =$$

$$\bar{x}\bar{z} + \bar{x}z + \bar{y}z$$

$$\bar{x}(\bar{z} + z) + \bar{y}z$$

$$\bar{x} + \bar{y}z \quad \#$$

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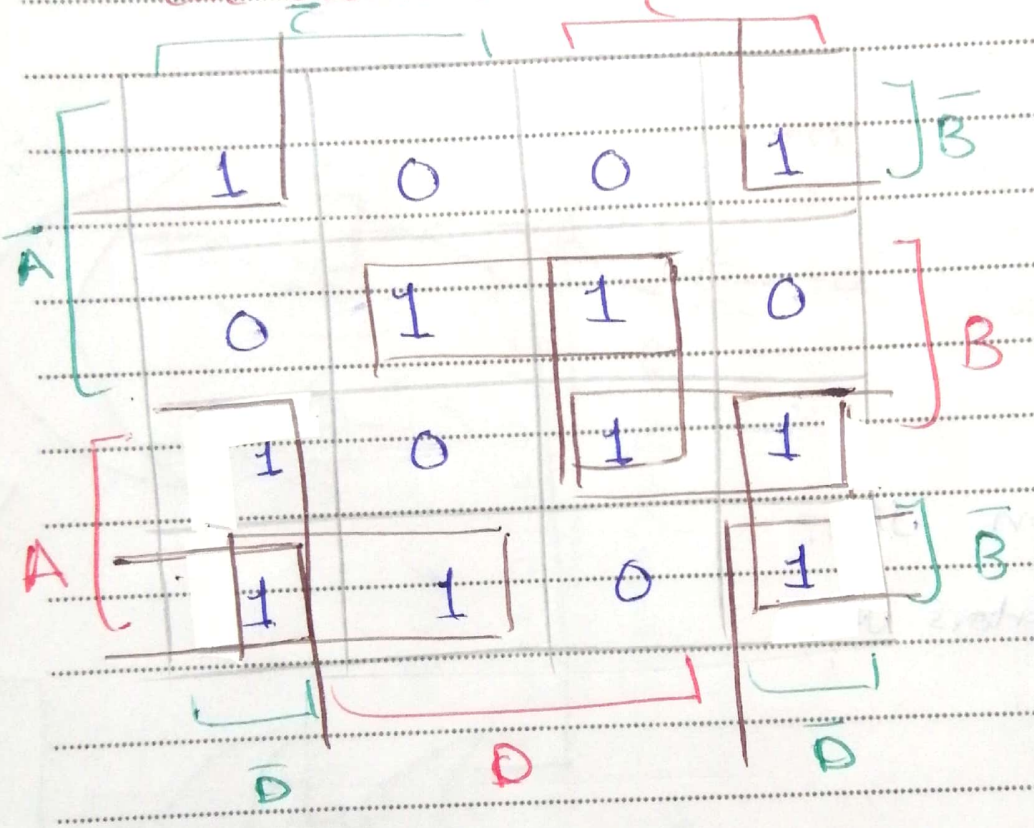
Problem 4: consider the following k-map for the function F(A,B,C,D). identify its prime implicants and determine which are essential.



Implicants:

$\bar{B}\bar{C}$ → essential

$A\bar{D}$ → essential

$A\bar{B}\bar{C}$ → essential

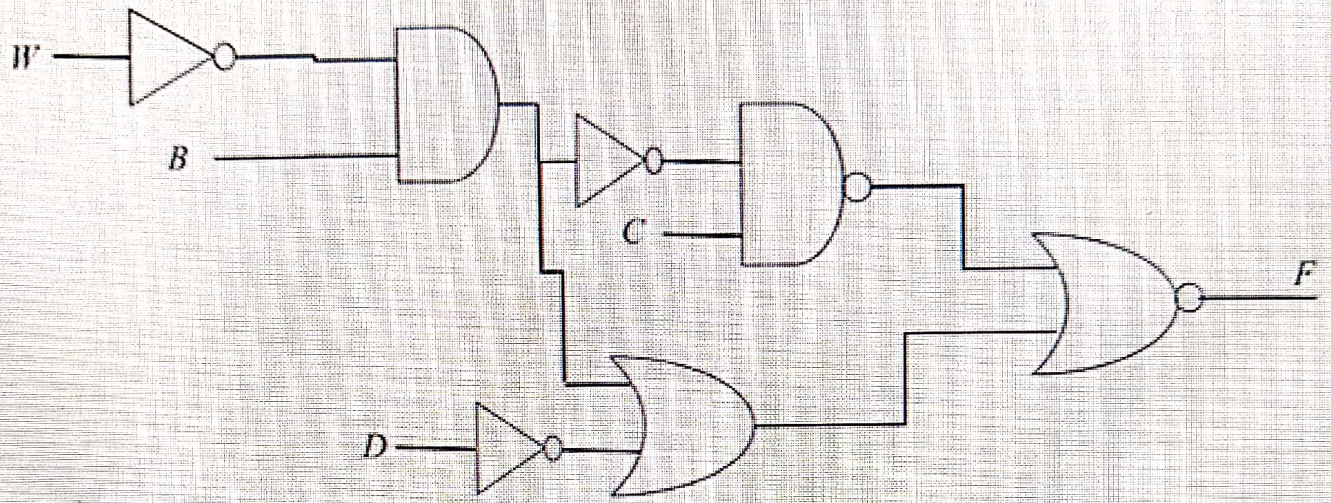
ABC

BCD

$\bar{A}BD$ → essential

Problem 5: In the space give below redesign the following function using NOR gates and inverters only.

(2 Points)



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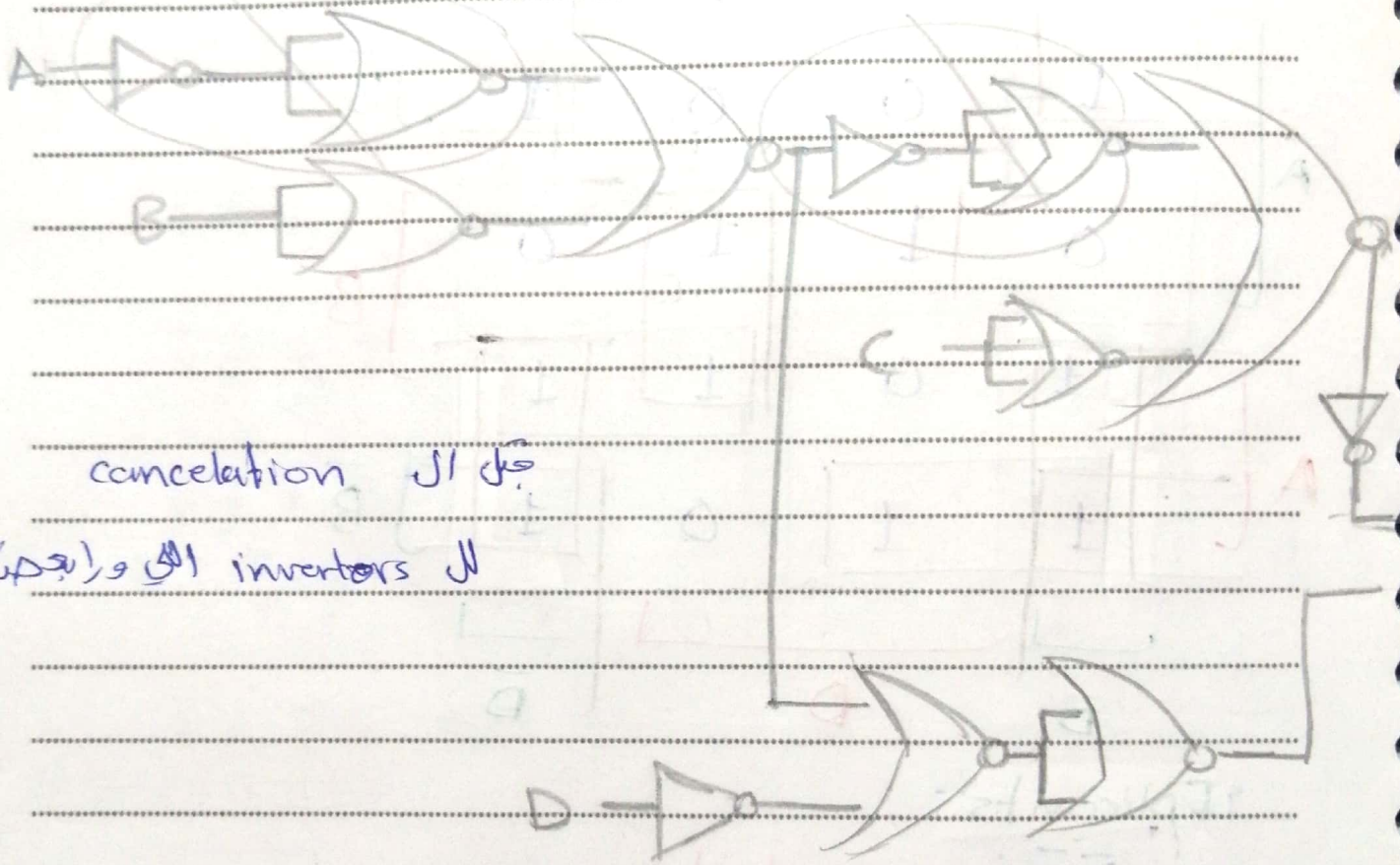
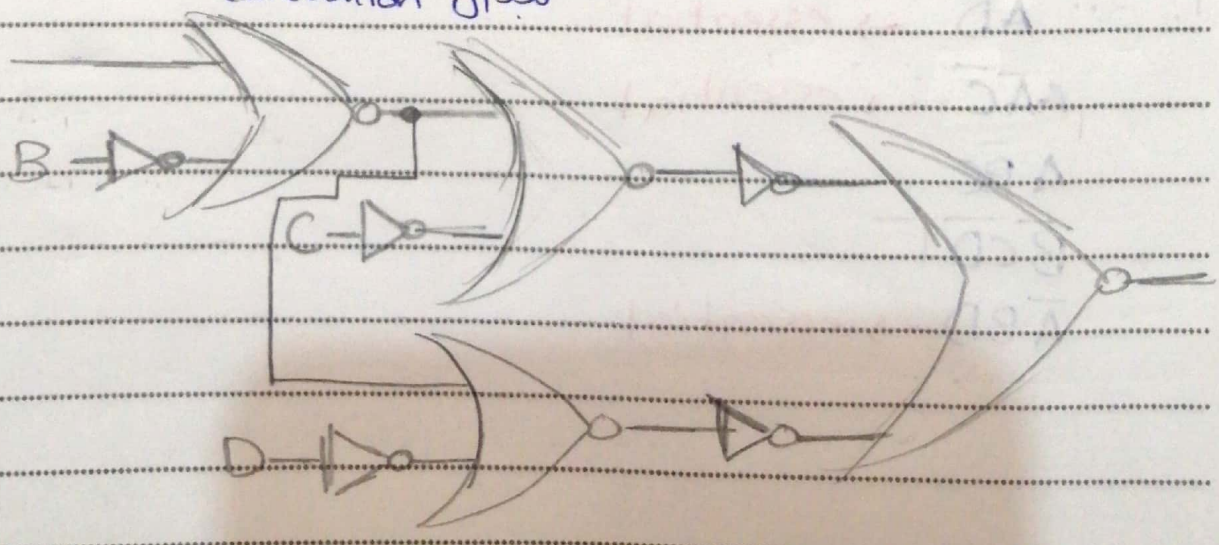
Problem 5

redesign the following function using NOR gates and inverters only.



cancelation الى

inverters الى وإضافة



cancelation الى

STARS NOTE BOOK

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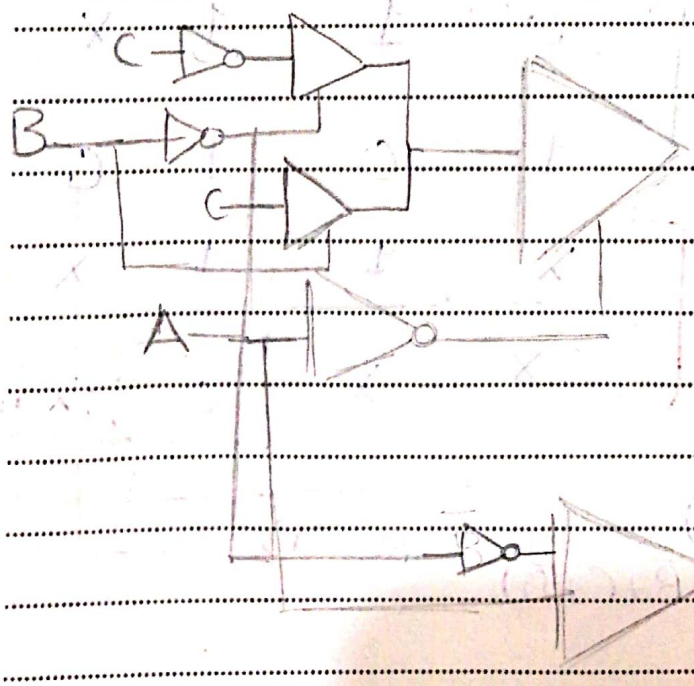
problem6

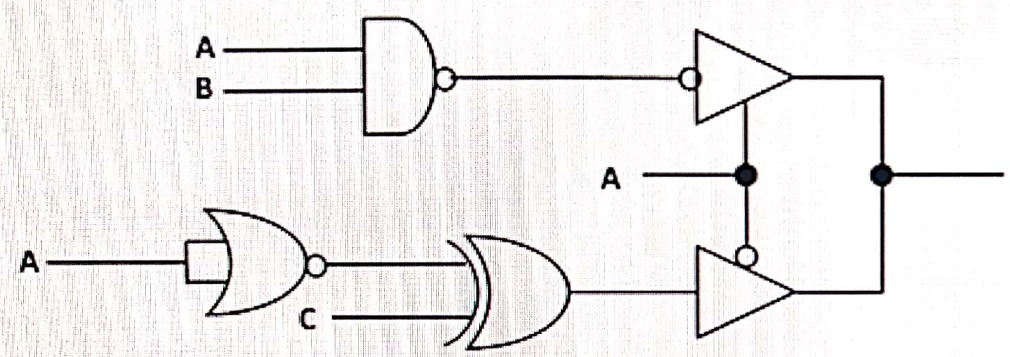
the truth table for F(A,B,C), draw the implementation of the function using tri-state buffers and inverstors only

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



buffers عدد
4
inverters عدد
3

Problem 7. Given the logic diagram of function F Fill in the table on the right for the given combinations **(2 Points)**

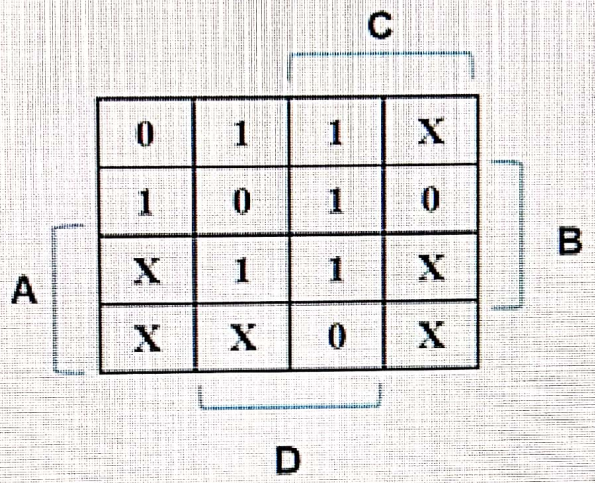


A	B	C	F
1	0	0	
1	1	1	
0	1	0	
0	1	1	

Problem 8: Given the Kmap for function F write the Boolean expression of F as a POS. **(2 Points)**

C

Problem 8: Given the Kmap for function F write the Boolean expression of F as a POS. **(2 Points)**



F (A, B, C, D) =

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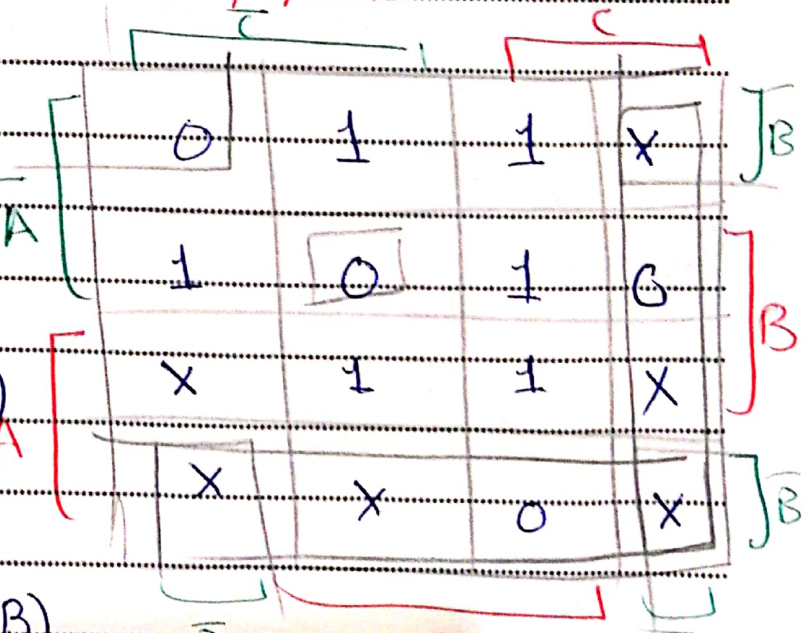
Problem 7

Given the logic diagram of function F
Fill in the table the given combinations:

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

Problem 8

Given K-map for function F, write boolean expression of F as a POS



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

dual $\overline{F} = (C+\overline{D}).(A+\overline{B}).(\overline{B}+\overline{D}).(\overline{A}+B+\overline{C}+D)$

F as POS $= (\overline{C}+D).(\overline{A}+B).(B+D).(A+\overline{B}+C+\overline{D})$

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problem 9

Box 1 $\overline{y}$

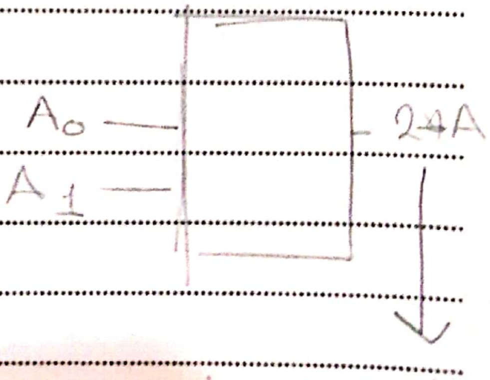
Box 2   0 or ω

Box 3 $\overline{x}$

Box 4   1 or x or y

problem 10 write the truth table for a combinational logic circuit that takes as an input a 2 bit binary number A and produces as an output the multiplication of A by 2.

A*2		A_1	A_0	O_2	O_1	O_0
0	←	0	0	0	0	0
2	←	0	1	0	1	0
4	←	1	0	1	0	0
6	←	1	1	1	1	0



مش مشروط حجم ال output ← 2 bits

حسب الأكبر output بيختار عدد الخانات بال output

S T A R S   N O T E   B O O K

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