



College of Computer and Information Sciences  
Computer Science Department  
Computer Organization (CSC ٢٢٠)

Homework-١

٢nd Semester ١٤٤٤ (٢٠٢٢-٢٠٢٣)

Last date of submission: Thursday, January ١٢, ٢٠٢٣

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Section	NCAAA CLO	Maximum	Score	Remark
Q١	١,١ Data Representation	١		
Q٢	١,٢ Digital circuit design and simplification	١		
Total		٢		



a) Perform the following conversions manually (you must show the computations):

138.125

$$\begin{array}{cccccccc} 2^7 & 2^6 & 2^5 & 2^4 & 2^3 & 2^2 & 2^1 & 2^0 & 2^{-1} & 2^{-2} & 2^{-3} \\ 1 & 1 & 0 & 1 & 1 & 0 & 1 & 1 & 0 & 1 & 1 \end{array}$$

$$= 1 + 4 + 8 + 32 + 64 + 128 + \frac{1}{2} + \frac{1}{8}$$

$$= 237.625$$

$$\begin{array}{ccccccc} 2^3 & 2^2 & 2^1 & 2^0 & 2^3 & 2^2 & 2^1 & 2^0 \\ 1 & 1 & 1 & 0 & 1 & 1 & 0 & 1 \\ \hline & & & & 8 & + 4 & + 1 & \end{array}$$

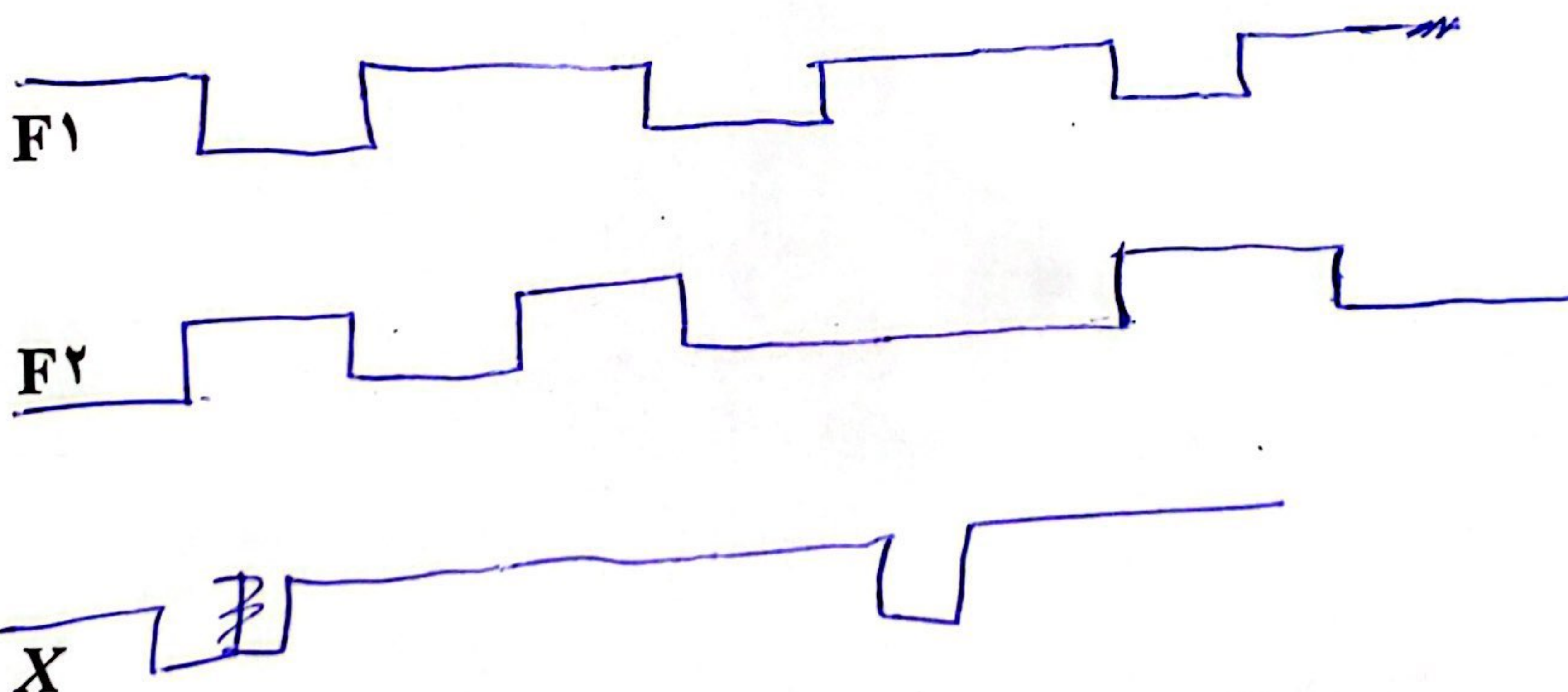
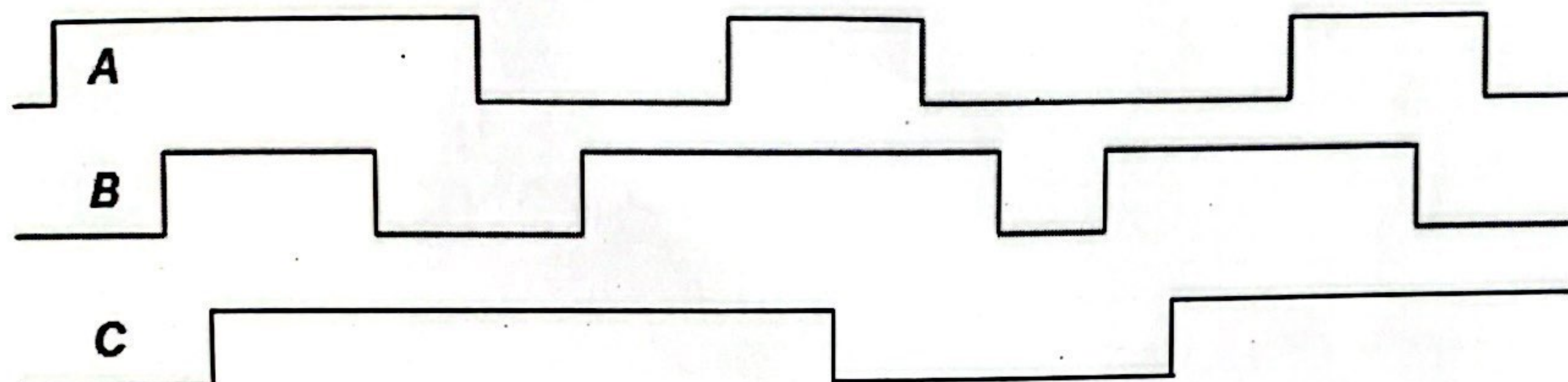
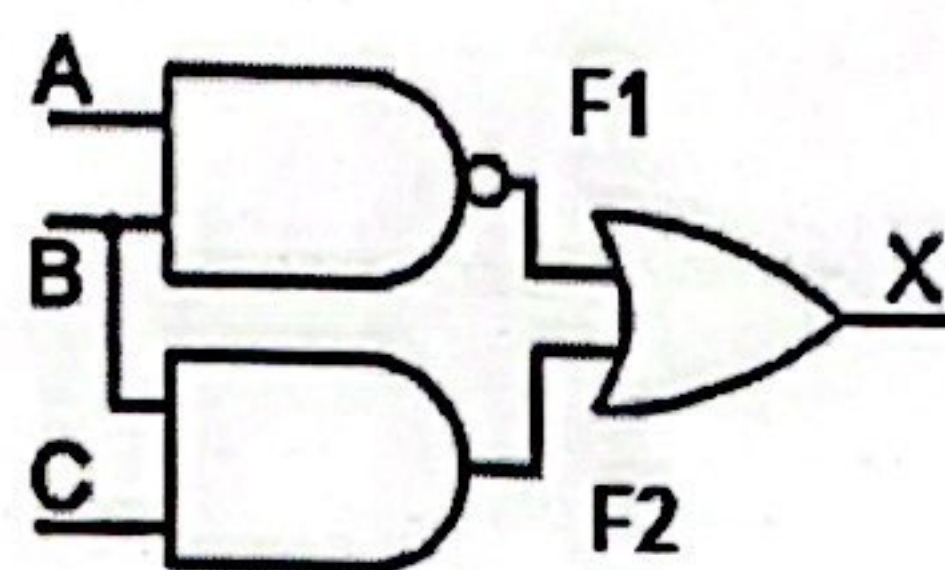
ED.A

[illegible]

[illegible]



5) Consider the logic circuit and input waveforms A, B, C below. Draw the resulting waveform at F1, F2, and X.





Design a combinational circuit accepts a 3-bit binary number and generate a 4-bit binary output by adding five (5) with the input number (e.g. if input is 101 the output is 1010).

Give the truth table

Write the output expression in SOP form

Design the circuit.

A	B	C	S <sub>3</sub>	S <sub>2</sub>	S <sub>1</sub>	S <sub>0</sub>
0	0	0	0	1	0	1
0	0	1	0	1	1	0
0	1	0	0	1	1	1
0	1	1	1	0	0	0
1	0	0	1	0	0	1
1	0	1	1	0	1	0
1	1	0	1	0	1	1
1	1	1	1	1	0	0

ii)

$\bar{A}$	$\bar{B}\bar{C}$	$\bar{B}C$	$BC$	$B\bar{C}$
1	1			1
1				

$$S_0 = \bar{C}$$

$\bar{A}$	$\bar{B}\bar{C}$	$\bar{B}C$	$BC$	$B\bar{C}$
		1		1
		1		1

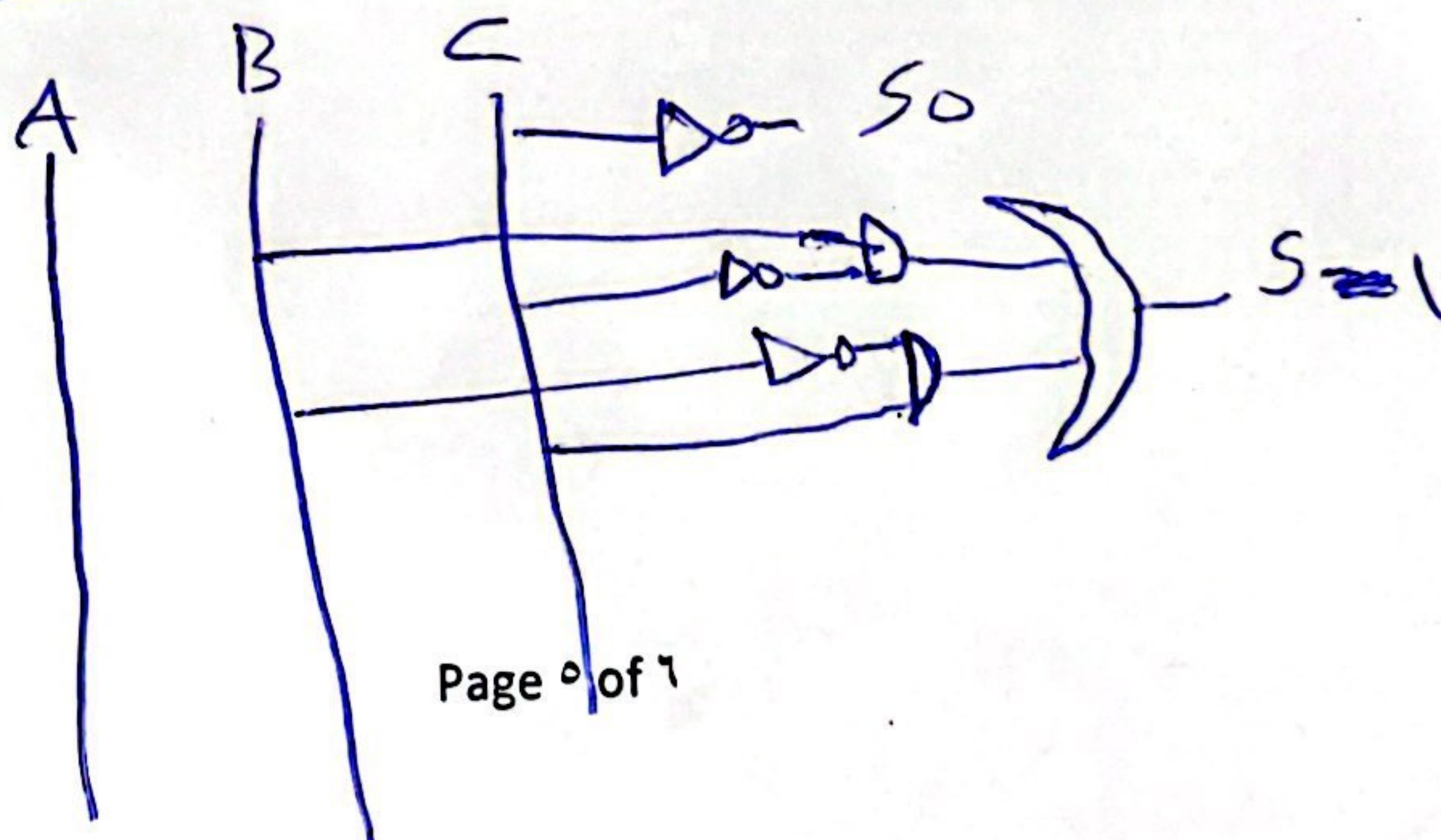
$$S_1 = \bar{B}\bar{C} + \bar{B}C$$

$\bar{A}$	$\bar{B}\bar{C}$	$\bar{B}C$	$BC$	$B\bar{C}$
1	1	1		1
			1	

$$S_2 = \bar{A}\bar{C} + \bar{A}B + ABC$$

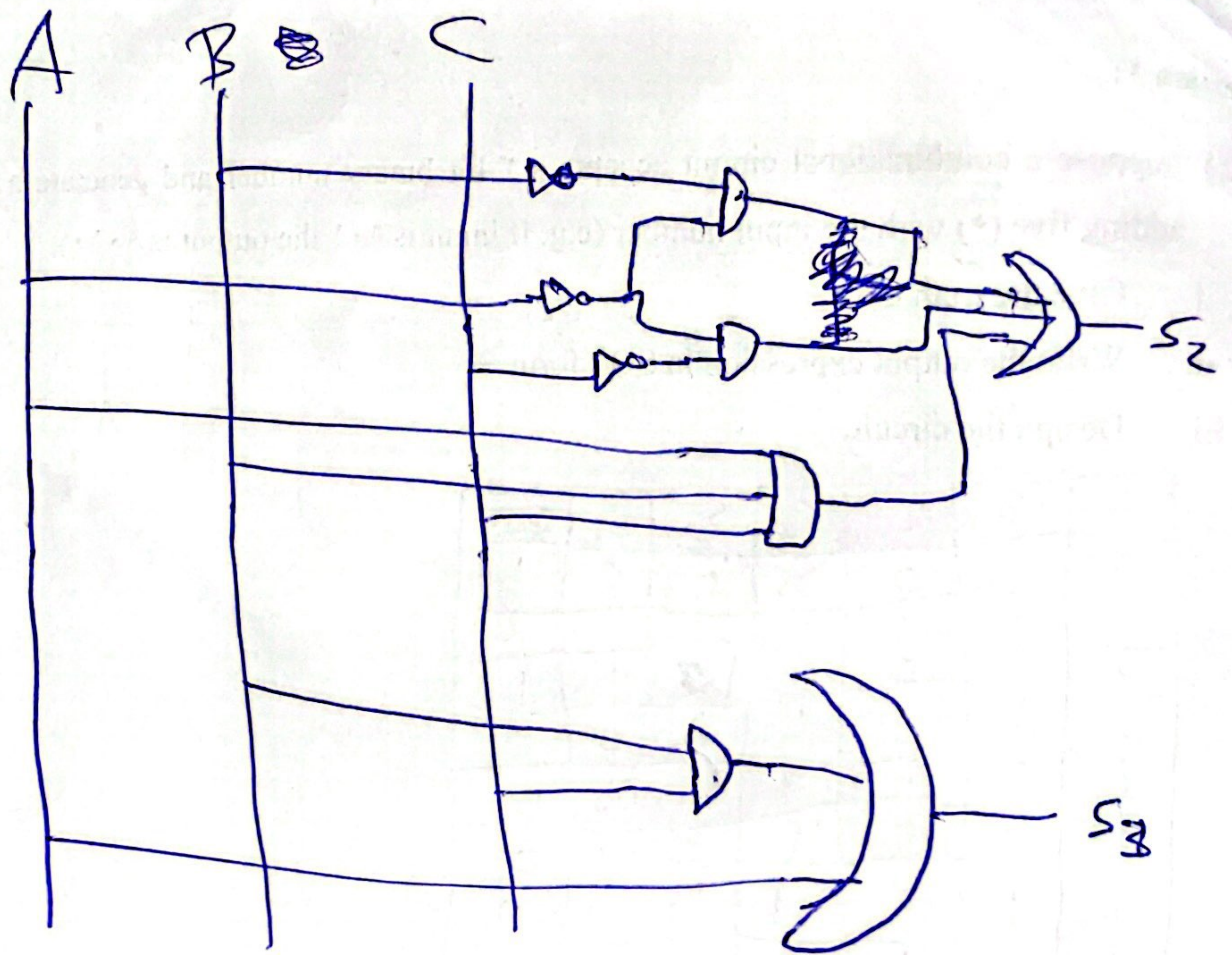
$\bar{A}$	$\bar{B}\bar{C}$	$\bar{B}C$	$BC$	$B\bar{C}$
1			1	
1	1		1	1

$$S_3 = A + BC$$





**simplify the**

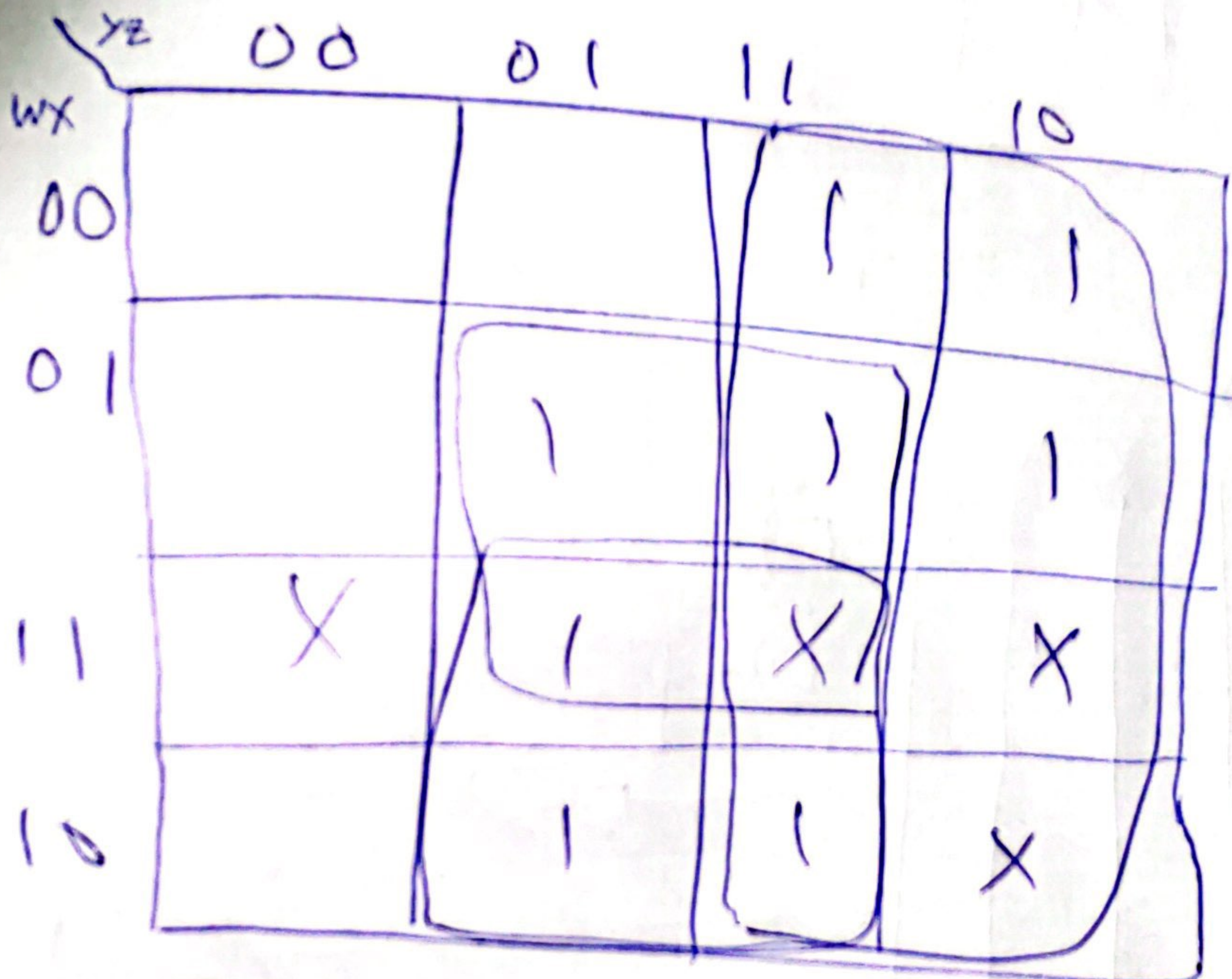




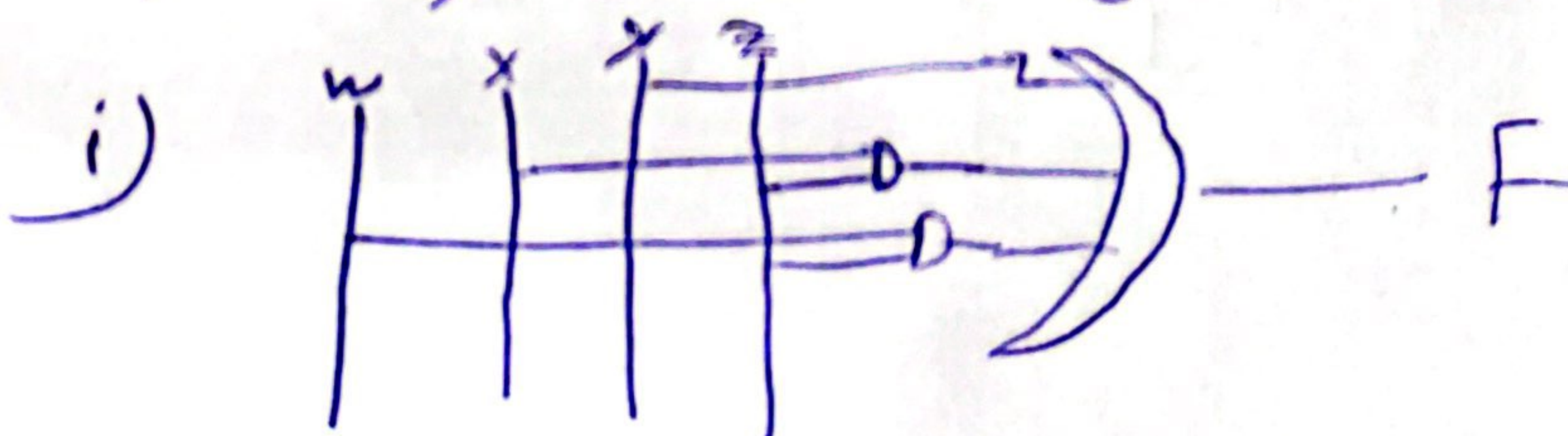
Following function with K-map

$$F(W, X, Y, Z) = \sum m(1, 2, 3, 4, 5, 6, 11, 12) + \sum d(10, 13, 14, 15)$$

- i. Implement it with basic logic gates.
- ii. Implement it with only NAND gates.
- iii. Implement it with only NOR gates.

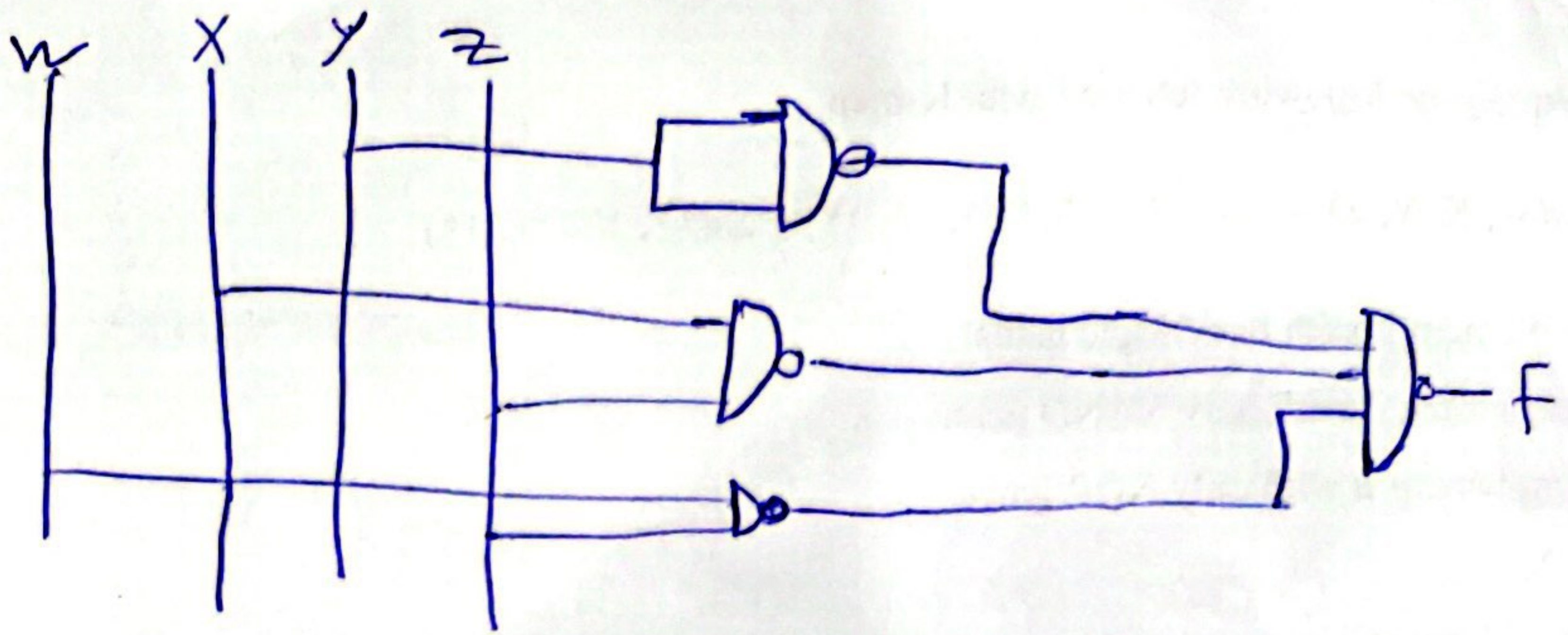


$$F = Y + XZ + WZ$$





ii)  $\overline{\overline{F}} = \overline{y \cdot \overline{xz} \cdot \overline{wz}}$



iii)  $F = y + \overline{\overline{xz}} + \overline{wz} = y + (\overline{x} + \overline{z}) + (\overline{w} + \overline{z})$

