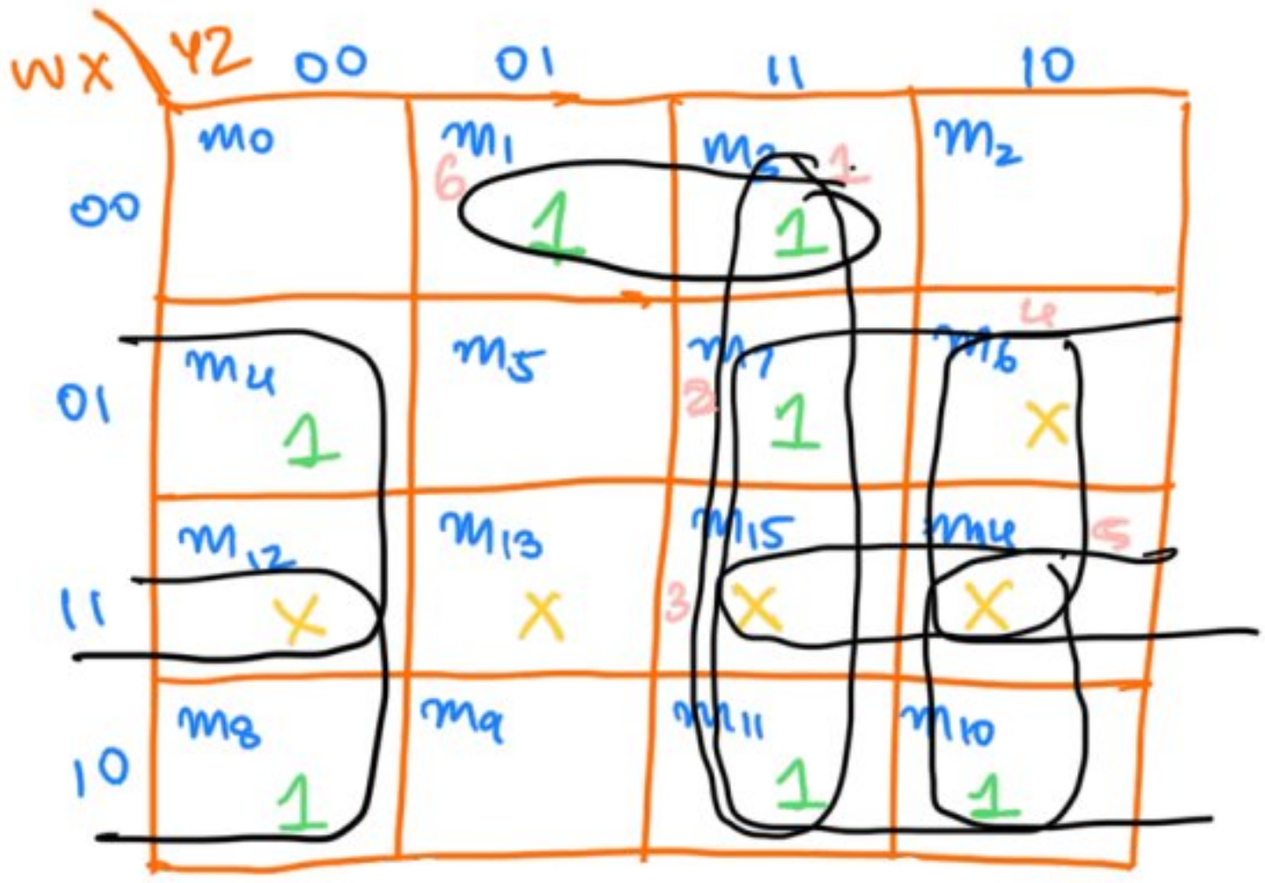
FCSD assignment - 1

Q.1.

	W	X	Y	Z	F
m_0	0	0	0	0	0
m_1	0	0	0	1	1
m_2	0	0	1	0	0
m_3	0	0	1	1	1
m_4	0	1	0	0	1
m_5	0	1	0	1	0
m_6	0	1	1	0	x
m_7	0	1	1	1	1
m_8	1	0	0	0	1
m_9	1	0	0	1	0
m_{10}	1	0	1	0	1
m_{11}	1	0	1	1	1
m_{12}	1	1	0	0	x
m_{13}	1	1	0	1	x
m_{14}	1	1	1	0	x
m_{15}	1	1	1	1	x



minterms:

m_1, m_3, m_4

m_7, m_8, m_{10}, m_{11}

1: YZ : m_3, m_7, m_{11} ✓

2: XY : m_7

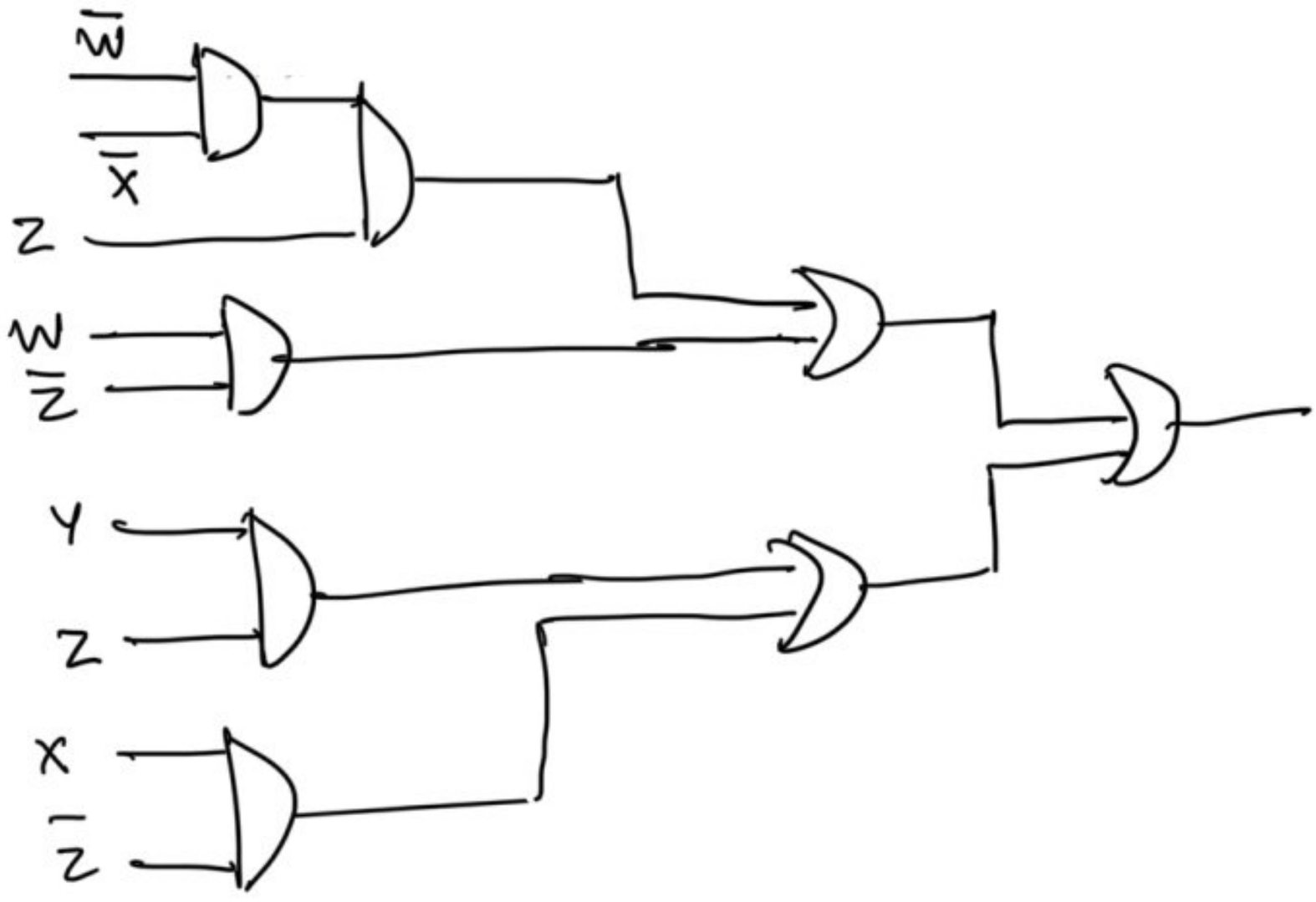
3: WY : m_{11}, m_{10}

4: $X\bar{Z}$: m_{10}, m_8 ✓

5: $W\bar{Z}$: m_4 ✓

6: $\bar{W}\bar{X}Z$: m_1, m_3 ✓

1.a) $\bar{W}\bar{X}Z + W\bar{Z} + X\bar{Z} + YZ$



1.b) $\overline{(\bar{W}\bar{X}Z + W\bar{Z} + X\bar{Z} + YZ)}$

$\Rightarrow \overline{(\bar{W}\bar{X}Z)} \cdot \overline{(W\bar{Z})} \cdot \overline{(X\bar{Z})} \cdot \overline{(YZ)}$

A B C D

$\Rightarrow$ Nand $(A, B, C, D) = \overline{A \cdot B \cdot C \cdot D}$

$= (\overline{AB}) \cdot (\overline{CD})$

$=$

$AB = \overline{\overline{A \cdot B} \cdot \overline{A \cdot B}}$

$\text{Illeg } CD = \overline{\overline{C \cdot D} \cdot \overline{CD}}$

$A = \overline{\overline{W}\,\overline{X}\,Z}$

$= \overline{\overline{L \cdot M}}$

$\Rightarrow L = \overline{W}\,\overline{X}$ as nand

$= \overline{\overline{\overline{W}\,\overline{X}}}$

$= \overline{W + X}$

$= \overline{\overline{W} \cdot \overline{X}}$

$W + X = \overline{W} \cdot \overline{X}$

$\overline{\overline{W} \cdot \overline{X}} \Rightarrow \text{nand}(\overline{W}, \overline{X})$

$\downarrow$

$\text{nand}\left(\overline{\overline{W} \cdot \overline{X}}, \overline{\overline{W} \cdot \overline{X}}\right) = \overline{W} \cdot \overline{X}$

$A = \text{nand}(\overline{W} \cdot \overline{X}, Z)$
