Q3.

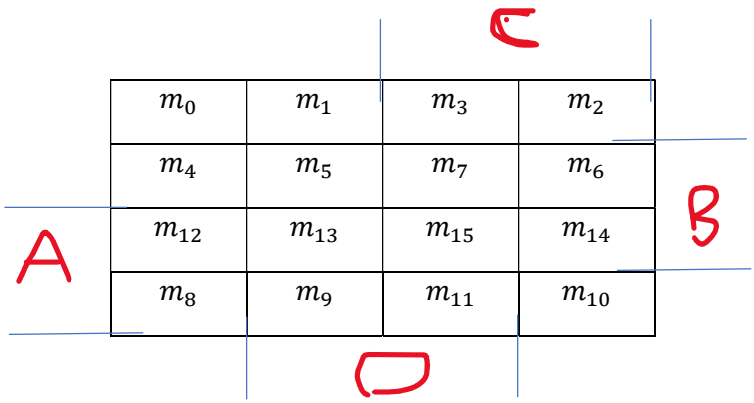
Truth Table:

Input					**2's complement**			
A	B	C	D		W	X	Y	Z
0	0	0	0		0	0	0	0
0	0	0	1		0	0	0	1
0	0	1	0		0	0	1	0
0	0	1	1		0	0	1	1
0	1	0	0		0	1	0	0
0	1	0	1		0	1	0	1
0	1	1	0		0	1	1	0
0	1	1	1		0	1	1	1
1	0	0	0		1	0	0	0
1	0	0	1		0	1	1	1
1	0	1	0		0	1	1	0
1	0	1	1		0	1	0	1
1	1	0	0		0	1	0	0
1	1	0	1		0	0	1	1
1	1	1	0		0	0	1	0
1	1	1	1		0	0	0	1

Using K-Maps to simplify for W,X,Y,Z:

For W: The only minterm that has a value of 1 is m_8 which would result in $A * \bar{B} * \bar{C} * \bar{D}$ so that is the equation for W

For the rest: The k-map for 4 variables is as follows:



m_0	m_1	m_3	m_2
m_4	m_5	m_7	m_6
m_{12}	m_{13}	m_{15}	m_{14}
m_8	m_9	m_{11}	m_{10}

For X the K-Map is as follows:

0	0	0	0
1	1	1	1
1	0	0	0
0	1	1	1

The maximum grouping has been labelled on the figure above. This grouping would result in the equation of X to be:

$$(\bar{A} * B) + (C * A * \bar{B}) + (D * A * \bar{B}) + (B * \bar{C} * \bar{D})$$

For Y the K-Map is as follows:

0	0	1	1
0	0	1	1
0	1	0	1
0	1	0	1

The maximum grouping has been labelled on the figure above. This grouping would result in the equation of Y to be:

$$(A * C * \bar{D}) + (\bar{A} * C) + (C * \bar{D})$$

For Z the K-Map is as follows:

0	1	1	0
0	1	1	0
0	1	1	0
0	1	1	0

The maximum grouping has been labelled on the figure above. This grouping would result in the equation of Z to be: D