

1. Signed magnitude and 2s Complement ( see notes for examples)

2. (a) 47 (b) -23

3.

$$\begin{array}{r} 01100101 \\ 01001100 \\ \hline 00011001 \end{array} \quad \text{or} \quad \begin{array}{r} 01100101 \\ 10110100 \\ \hline (1)00011001 \end{array} \quad \text{or} \quad 65_H - 4C_H = 19_H$$

4.

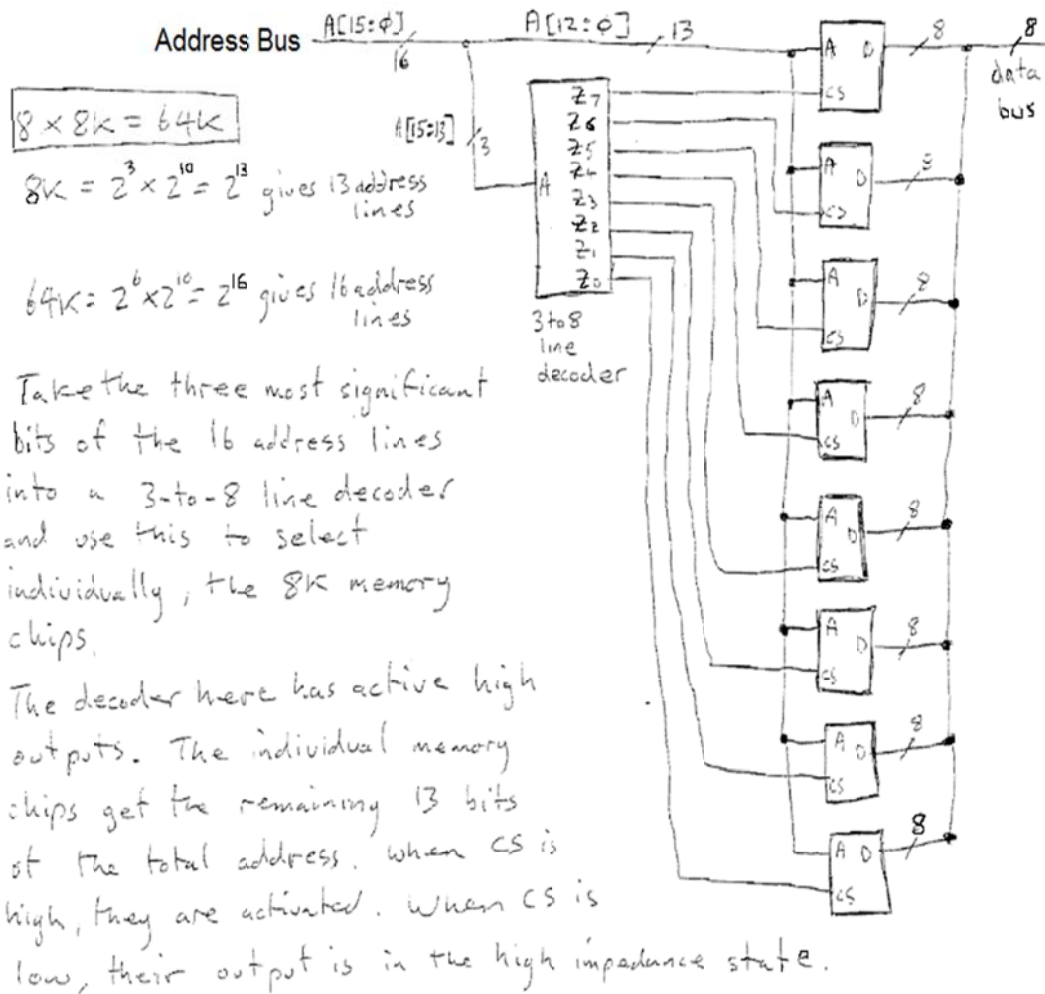
$$\begin{array}{r} 7C88 \\ 21BA \\ \hline 5ACE \end{array} \quad \begin{array}{r} 0111110010001000 \\ 0010000110111010 \\ \hline 0101101011001110 \end{array} \quad \begin{array}{r} 0111110010001000 \\ 1101111001000110 \\ \hline 0101101011001110 \end{array}$$

5.

$$\begin{array}{r} FFAE \\ 00B0 \\ \hline FEFE \end{array} \quad FEFE_{16} = 65278_{10} \quad 65278 + 1 = 65279$$

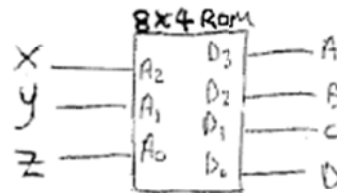
+1 for inclusive range  $65279 \times 16 = 1044464$  bits

6.



7.

	A	B	C	D
	↓	↓	↓	↓
$D_3 A_1 A_0$	$D_3$	$D_2$	$D_1$	$D_0$
000	0	1	1	1
001	1	1	1	0
010	1	0	0	0
011	0	0	1	0
100	1	0	1	1
101	0	0	1	0
110	1	1	0	1
111	0	1	1	0



8.

$$F_{(t+1)} = (A + F).B$$

Present State F	inputs A B	Next State F
0	0 0	0
0	0 1	0
0	1 0	0
0	1 1	0
1	0 0	0
1	0 1	0
1	1 0	0
1	1 1	0

$$G_{(t+1)} = \overline{G+B}$$

Present State G	input B	Next State G
0	0	1
0	1	0
1	0	0
1	1	0

9.

T	$Q'$
0	$\overline{Q}$
1	$\overline{Q}$



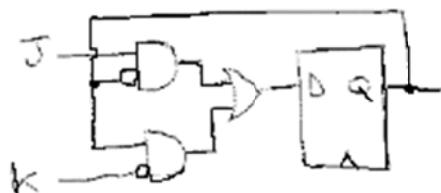
Q	T	$Q'$
0	0	0
0	1	1
1	0	1
1	1	0

$$Q' = Q \oplus T$$



10.

$$Q_{(t+1)} = J\overline{Q} + \overline{K}Q$$



See worked example 5 for a full explanation.