1) a) $W_1 X_1 + W_2 X_2 + b$

$W_1 = 2$
$W_2 = -1$
$b = 0.5$

I) $X_1 = 2 \quad X_2 = 4$

prediction = $\text{step}[2(2) - 1(4) + 0.5] = \text{step}[0.5] = 1$

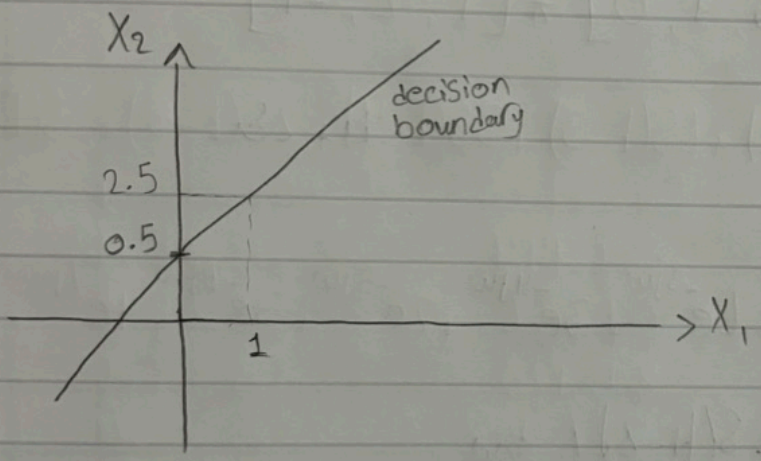
II) $X_1 = 4 \quad X_2 = 2$

prediction = $\text{step}[2(4) - 1(2) + 0.5] = \text{step}[6.5] = 1$

III) $X_1 = 2 \quad X_2 = 2$

prediction = $\text{step}[2(2) - 1(2) + 0.5] = \text{step}[2.5] = 1$

b)



the region under the decision boundary is class 1

c) Sometimes the decision boundary doesn't exist

2) a) 18 b) 4)

c) $2\times4+2$
$+4\times2+4$
$+2\times4+2$
$+4\times2+4$
$+2\times4+2 = 54$

3) $[0,3,4,6,3,2,3,4,0] * [1,2,-1]$

0	3	4	6	3	2	3	4	0			1
	0	3	4	6	3	2	3	4	0		2
		0	3	4	6	3	2	3	4	0	-1
0	3	10	11	11	2	4	8	5	-4	0	

$= [0,3,10,11,11,2,4,8,5,-4,0]$

4) the length of the output array without padding is

$$L_{out} = L - F + 1$$

in order for L_{out} to be equal to L

$$L = (L + 2x) - F + 1$$

where x is the number of zeros to be added on each side

$$x = \frac{F-1}{2}$$

$$\begin{bmatrix} 2 & -1 \\ 1 & 2 \end{bmatrix}$$

5)
$$\begin{bmatrix} 3 & 5 & 2 & 2 \\ 1 & -1 & 3 & -1 \\ 0 & 6 & 3 & 7 \\ 10 & -3 & 5 & 6 \end{bmatrix} * \begin{bmatrix} 2 & 1 \\ -1 & 2 \end{bmatrix}$$

$$= \begin{bmatrix} 2\times3+5\times-1+1\times1+2\times-1 & 5\times2+2\times-1+1\times-1+3\times2 & 2\times2+2\times-1+3\times1+2\times-1 \\ 1\times2-1\times-1+0\times1+6\times2 & 2\times-1+3\times-1+6\times1+3\times2 & 3\times2-1\times-1+3\times1+7\times2 \\ 0\times2+6\times-1+10\times1+2\times-3 & 6\times2+3\times-1+1\times-3+5\times2 & 3\times2+7\times-1+5\times1+6\times2 \end{bmatrix}$$

$$= \begin{bmatrix} 0 & 13 & 3 \\ 15 & 7 & 24 \\ -2 & 16 & 16 \end{bmatrix}$$

6)

	O/P size	Parameters	memory
Conv1	127x127x96	34,944	5.89 MB
Conv2	127x127x256	614,656	15.69 MB
Conv3	63x63x384	885,120	5.8 MB
Conv4	63x63x384	1,327,488	5.8 MB
Conv5	63x63x384	884,992	3.88 MB
FC6	4096	37,752,832	16 KB
FC7	4096	16,781,312	16 KB
FC8	1000	4,097,000	4 KB