Ans to the Qs: 2

Parameter sharing occurs when a feature map is generated from the result of convolution between a filter and input data from a unit in a plane in the convolution layer. This results in all or most of the units in the layer sharing the weights, which is a major feature of CNNs.

CNN for vertical boundaries:

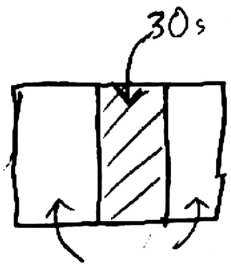
$$\begin{bmatrix} 10 & 10 & 10 & 0 & 0 & 0 \\ 10 & 10 & 10 & 0 & 0 & 0 \\ 10 & 10 & 10 & 0 & 0 & 0 \\ 10 & 10 & 10 & 0 & 0 & 0 \\ 10 & 10 & 10 & 0 & 0 & 0 \\ 10 & 10 & 10 & 0 & 0 & 0 \end{bmatrix} \times \begin{bmatrix} 1 & 0 & -1 \\ 1 & 0 & -1 \\ 1 & 0 & -1 \end{bmatrix} = \begin{bmatrix} 0 & 30 & 30 & 0 \\ 0 & 30 & 30 & 0 \\ 0 & 30 & 30 & 0 \\ 0 & 30 & 30 & 0 \end{bmatrix}$$

6X6 image

3X3 filter 1

4X4

Convolving with this filter results in having the middle part of the 4X4 result in having a dark boundary shown below:



Filter 2 would represent detection of light edges. Therefore, ~~resultti~~ resulting in a 4x4 image having light boundaries.

-1	0	1
-1	0	1
-1	0	1

Filter 2