Q 1.1) b) continuation

collumns

$$z' = M x' \Leftrightarrow \begin{bmatrix} z_1 \\ \vdots \\ z_2 \\ \vdots \end{bmatrix} = \begin{array}{c} a \\ \\ \\ b \\ \\ \\ c \end{array} \begin{bmatrix} [W_1^T|0] & [W_2^T|0] & \cdots & [W_n^T|0] & 0 \cdots 0 \\ 0 & [W_1^T|0] & \cdots & [W_n^T|0] & 0 \cdots 0 \\ \cdots & \cdots & \cdots & \cdots & \cdots \\ 0 \cdots 0 & [W_1^T|0] & \cdots & \cdots & [W_n^T|0] \\ [0\,W_1^T|0] & [0\,W_2^T|0] & \cdots & [0\,W_n^T|0] & 0 \cdots 0 \\ 0 & [0\,W_1^T|0] & \cdots & [0\,W_n^T|0] & 0 \cdots 0 \\ \cdots & \cdots & \cdots & \cdots & \cdots \\ 0 \cdots 0 & [0|W_1^T] & [0|W_2^T] & \cdots & [0|W_n^T] \end{bmatrix} \begin{bmatrix} x_1 \\ | \\ x_2 \\ | \\ \cdots \end{bmatrix}$$

~~Where $[W_1^T|0]$ is~~

Where in the first line $[W_1^T|0]$ is a padded version of $W_1^T$ with zeros to only apply to $x_1$ "collumn" of $x'$. in line 2 we "moved" the filter one to the right so that $[W_1^T|0]$ now applies to $x_2$. We do this for every collumn of the first line of the image, in "step" a. then we move the filter one line bellow, $[0\,W_1^T|0]$, in "step b" and ~~repeat~~ repeat the process for the second line of the image. We do this for all lines of the image to get $\begin{bmatrix} z_1 \\ \vdots \\ z_2 \\ \vdots \end{bmatrix}$.