Edge Detection With 1D Masks Tutorial Exercise

At an edge detection system, the input image is initially row-wise scanned by employing the mask: $[1 \quad -2 \quad 1]$ and the output of this convolution is column-wise scanned by the filter: $[1 \quad -2 \quad 1]^T$. Prove that the z-transform property for convolutions is useful for determining the transfer function of this system without the need of calculating the convolutions and define a $2D$ mask that can achieve the same result.