kernel:

$$\begin{bmatrix} 0 & -1 & 0 \\ -1 & 5 & -1 \\ 0 & -1 & 0 \end{bmatrix}$$

Upstream gradient *dout*:

$$\begin{bmatrix} 3 & -1 \\ 1 & 2 \end{bmatrix}$$

The derivate $\frac{\partial y}{\partial x}$ has to have the same shape as $x \to 4 \times 4$.
Remember, that for 1D affine layer

$$\to \frac{\partial y}{\partial x} = 1 \cdot w + 0 = w$$

Therefore, for each kernel stride, we t ke the kernel of weights and multiply it by its corresponding upstream gradient. Then, we sum all the values at the relevant entries:

$$\begin{bmatrix} 0 & (-1) \quad 0 & 0 \quad (-1) & 0 \\ (-1) \quad 0 & 5 \quad (-1) \quad (-1) \quad 0 & (-1) \quad 5 \quad 0 \quad (-1) & (-1) \quad 0 \\ 0 \quad (-1) & (-1) \quad 0 \quad 5 \quad (-1) & 0 \quad (-1) \quad (-1) \quad 5 & 0 \quad (-1) \\ 0 & (-1) \quad 0 & 0 \quad (-1) & 0 \end{bmatrix}$$

$$\begin{bmatrix} 3 \cdot 0 & 3 \cdot (-1) + (-1) \cdot 0 & 3 \cdot 0 + (-1) \cdot (-1) & (-1) \cdot 0 \\ 3 \cdot (-1) + 1 \cdot 0 & 3 \cdot 5 + (-1) \cdot (-1) + 1 \cdot (-1) + 2 \cdot 0 & 3 \cdot (-1) + (-1) \cdot 5 + 1 \cdot 0 + 2 \cdot (-1) & (-1) \cdot (-1) + 2 \cdot 0 \\ 3 \cdot 0 + 1 \cdot (-1) & 3 \cdot (-1) + (-1) \cdot 0 + 1 \cdot 5 + 2 \cdot (-1) & 3 \cdot 0 + (-1) \cdot (-1) + 1 \cdot (-1) + 2 \cdot 5 & (-1) \cdot 0 + 2 \cdot (-1) \\ 1 \cdot 0 & 1 \cdot (-1) + 2 \cdot 0 & 1 \cdot 0 + 2 \cdot (-1) & 2 \cdot 0 \end{bmatrix}$$

$$=$$

$$\begin{bmatrix} 0 & -3 & 1 & 0 \\ -3 & 15 & -10 & 1 \\ -1 & 0 & 10 & -2 \\ 0 & -1 & -2 & 0 \end{bmatrix}$$

If you mistakenly calculated $\frac{\partial y}{\partial w}$:

$$\begin{bmatrix} 6 & 10 & 4 \\ -3 & 12 & -5 \\ 6 & 4 & -1 \end{bmatrix}$$