Computational Photography (CSCI 3240U) — In-class Exercise

Please hand in this paper to the instructor before the end of the lecture.

Lastname (PRINT):	_____	Firstname:	_____
Student number:	_____	Date:	_____

Q. Consider the following image, use Sobel filters to compute gradient direction and magnitude at pixel $(3, 3)$

Top left corresponds to pixel location $(0, 0)$

7	13	12	10	10	13	7	12
8	7	36	41	44	35	11	14
12	44	82	83	83	77	44	13
12	38	79	80	80	75	41	13
11	36	81	76	83	82	43	8
13	42	85	83	79	85	38	10
11	9	35	45	39	44	8	14
13	12	10	13	11	10	10	8

Sobel filters in x and y direction are $\begin{pmatrix} 1 & 0 & -1 \\ 2 & 0 & -2 \\ 1 & 0 & -1 \end{pmatrix}$ and $\begin{pmatrix} 1 & 2 & 1 \\ 0 & 0 & 0 \\ -1 & -2 & -1 \end{pmatrix}$, respectively. Now imagine that you are asked to compute gradient magnitude for each pixel (ignoring the boundaries), how many multiplications would you need to compute it?