Computer Vision I (CSCI 3240U) **In-class Exercise**

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

Name: _____

Student number: _____ Date: _____

Q. Consider the following setup that shows a center pixel along with its eight neighbours:

$$\begin{pmatrix} 10 & 10 & 10 \\ 50 & 50 & 50 \\ 90 & 90 & 90 \end{pmatrix}.$$

Use the 3×3 sobel filters provided below to compute gradient at the center pixel and determine if this pixel sits on a corner or not?

$$G_x = \begin{pmatrix} 1 & 0 & -1 \\ 2 & 0 & -2 \\ 1 & 0 & -1 \end{pmatrix} \text{ and } G_y = \begin{pmatrix} 1 & 2 & 1 \\ 0 & 0 & 0 \\ -1 & -2 & -1 \end{pmatrix}.$$

Q. Now consider a 5×5 window centered at pixel (x, y). Write down a scheme to detect whether or not pixel (x, y) sits on a corner.

Q. When we look at the distribution of gradient vectors within a small local window (like a 3×3 or 5×5 grid), their orientation tells us exactly what kind of feature we've found:

- *Flat region*:

- *Edge*:

- *Corner*: