Exercise *Computer Vision (CSCI 4220U)*

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

Name: _____

Student number: _____ Date: _____

Q. Consider a 2D camera coordinate system whose x-axis is $(0.707, 0.707)$ and y-axis is $(-0.707, 0.707)$ in the world coordinate. Write down the matrix that we can use to convert a world point (x, y) into the camera coordinate system.

Q. Consider a 1D image $\mathbf{I}$ with N pixels. A filter $\mathbf{f}$ is applied to this image and the resulting image has $N - 16$ pixels. What is the *half-width* of filter $\mathbf{f}$.

Q. Consider a single pixel RGB video. This video has 5 frames as seen below (each column corresponds to a frame).

	frame 1	frame 2	frame 3	frame 4	frame 5
red	1	2	1	1	5
green	4	3	0	0	9
blue	1	2	4	2	5

Write down the 3×3 covariance matrix for the RGB values observed in this video. Also, write down the mean red, green, and blue values.