# Video Compression Assignment 3

In this assignment, we will use the block-based encoding approach, where the size of a block is 8x8. Only the Luma component is considered for the following questions.

## Prerequisites

- Programming langauge: Python 3.10+ (IPython)
- Framework: Jupyter

Install dependencies from PyPI:

In [1]:
```
# %pip install \
#     --disable-pip-version-check \
#     --quiet \
#     numpy \
#     Pillow
```

# Task 1

> Fourier Transform

Please apply the Fourier Transform to the luma component of `foreman_qcif_0_rgb.bmp` and demonstrate its magnitudes in a 2-D image, as shown in the example below. Note that you need to shift the origin to the center of the image for the magnitude plot.


$Y$ $\quad$ $|F(Y)|$

## Solution of Task 1

In [ ]:

# Task 2

> DCT

Please apply DCT to all the 8x8 luma blocks of `foreman_qcif_0_rgb.bmp` and use the quantization matrix below for quantization. After DCT and quantization, please apply inverse quantization and IDCT to decode all the blocks and show the decoded frame.

$$\begin{bmatrix} 16 & 11 & 10 & 16 & 24 & 40 & 51 & 61 \\ 12 & 12 & 14 & 19 & 26 & 58 & 60 & 55 \\ 14 & 13 & 16 & 24 & 40 & 57 & 69 & 56 \\ 14 & 17 & 22 & 29 & 51 & 87 & 80 & 62 \\ 18 & 22 & 37 & 56 & 68 & 109 & 103 & 77 \\ 24 & 35 & 55 & 64 & 81 & 104 & 113 & 92 \\ 49 & 64 & 78 & 87 & 103 & 121 & 120 & 101 \\ 72 & 92 & 95 & 98 & 112 & 100 & 103 & 99 \end{bmatrix}$$

## Solution of Task 2

In [ ]: