Q.1. (a) Write python from scratch for 2D Linear convolution sing Toeplitz matrix method between input=np.array([[1,2,3],[4,5,6],[7,8,9]])and filter=np.array([[1,2,1],[0,0,0],[-1,-2,-1]])

(b). Write python from scratch for 2D Linear convolution by Toeplitz matrix method between input image(lena.jpg) and kernel = np.array([[1, 2, 1],[2, 4, 2],[1, 2, 1]]))/16

(c) Compute number of multiplications required for 2D linear convolution

Q.2. (a)Write python from scratch for 2D Spatial Separable convolution between input image(lena.jpg) and Gaussian filter = np.array ([1,4,6,4,1], [4,16,24,16,4], [6,24,36,24,6], [4,16,24,16,4], [1,4,6,4,1])/256

(b) Compute number of multiplications required for 2D Spatial Separable convolution

Q.3. Write python from scratch to convert RGB Image (lena.tif) to YUV color image using the following equation.

Y = 0.299R + 0.587G + 0.114B

U = -0.147R - 0.289G + 0.436B

V = 0.615R - 0.515G - 0.100B

Q.4. Write python from scratch to convert RGB Image (lena.jpg) to YCbCr color image using following equation.

Y= 16 + 65.738*R/256 + 129.057*G/256 + 25.064*B/256

Cb = 128-37.945*R/256 - 74.494*G/256 + 112.439*B/256

Cr = 128+112.439*R - 94.154*G/256 - 18.285*B/256