

✓ Question No.04

```
import numpy as np
import cv2 as cv
import matplotlib.pyplot as plt
from google.colab import drive
drive.mount('/content/drive')
im1 = cv.imread("/content/drive/MyDrive/images/shells.tif", cv.IMREAD_GRAYSCALE) #Load image

assert im1 is not None #Check whether the image is loaded

hist, bins = np.histogram(im1.ravel(), 256,[0,256]) #Plot the histogram before equalization
cdf = hist.cumsum()
cdf_norm = cdf * hist.max()/ cdf.max()
plt.plot(cdf_norm,color = 'b')
plt.hist(im1.flatten(), 256, [0,256], color = 'r')
plt.xlim([0,256])
plt.legend(('cdf', 'histogram'), loc = 'upper left')
plt.title('Histogram of before equalization')
plt.show()

im2 = cv.equalizeHist(im1) #Histogram equalization
hist, bins = np.histogram(im2.ravel(), 256, [0,256])
cdf = hist.cumsum()
cdf_norm = cdf * hist.max()/ cdf.max()

plt.plot(cdf_norm, color = 'b')#Plot the obtained results
plt.hist(im2.flatten(), 256, [0,256], color = 'r')
plt.xlim([0,256])
plt.legend(('cdf', 'histogram'), loc = 'upper left')
plt.title('Histogram of after equalization')
plt.show()

#Before equalization we can see that cdf increases nonlinearly
#But after equalized cdf increased uniformly.
```