```
import cv2 as cv

import  numpy as np
import matplotlib.pyplot as plt

from google.colab import drive
```

```
drive.mount('/content/drive')
% cd '/content/drive/MyDrive/Academics/UoM-Course-Work/Semester-04/Computer-Vision/Inclass
! ls
```

```
Mounted at /content/drive
/content/drive/MyDrive/Academics/UoM-Course-Work/Semester-04/Computer-Vision/Inclass/
shells.tif  spider.png  zion_pass.jpg
```

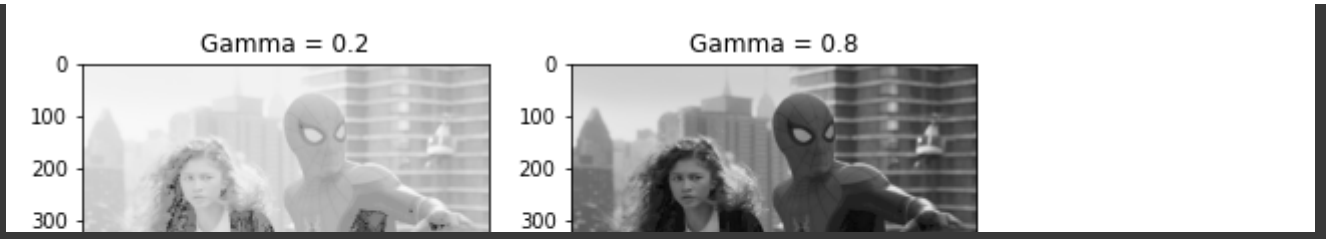
1.

```
gamma_arr = [[0.2,0.8],[1.2,2]]
inp_img = cv.imread(r'spider.png',cv.IMREAD_GRAYSCALE)

fig, ax = plt.subplots(2,2,figsize=(8,8))

for i in range(2):
  for j in range(2):
    gamma = gamma_arr[i][j]
    transformation = np.array([(p/255)**gamma*255 for p in range(256)]).astype(np.uint8)
    img_2 = cv.LUT(inp_img, transformation)
    out_img = cv.cvtColor(img_2, cv.COLOR_BGR2RGB)
    ax[i][j].imshow(out_img)
    ax[i][j].set_title(f'Gamma = {gamma}')

plt.show()
```



2.

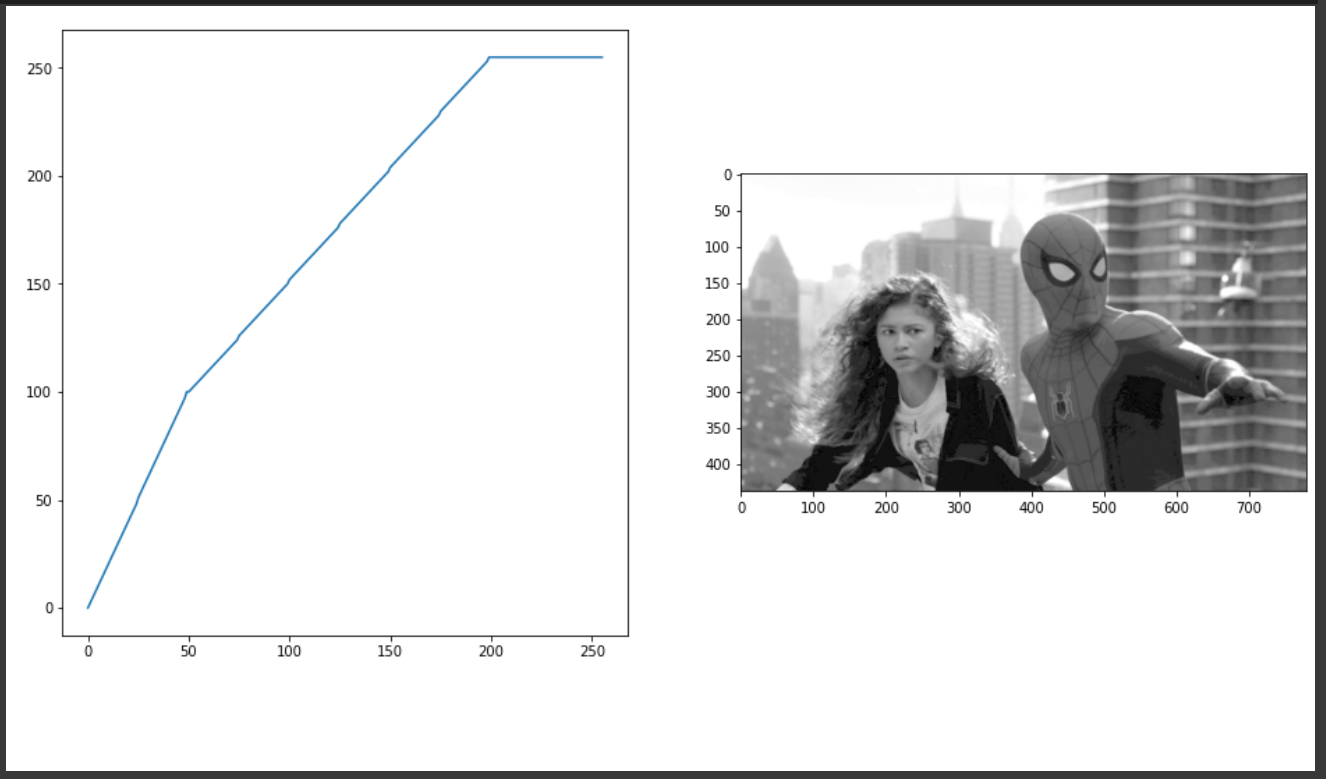
```
transformation = np.concatenate((np.linspace(0, 100, 50), np.linspace(100, 255, 150), np.o

fig, ax = plt.subplots(1,2, figsize=(16,8))

ax[0].plot(transformation)

inp_img = cv.imread(r'spider.png',cv.IMREAD_GRAYSCALE)
img_2 = cv.LUT(inp_img, transformation)
out_img = cv.cvtColor(img_2, cv.COLOR_BGR2RGB)
ax[1].imshow(out_img)

plt.show()
```



3.

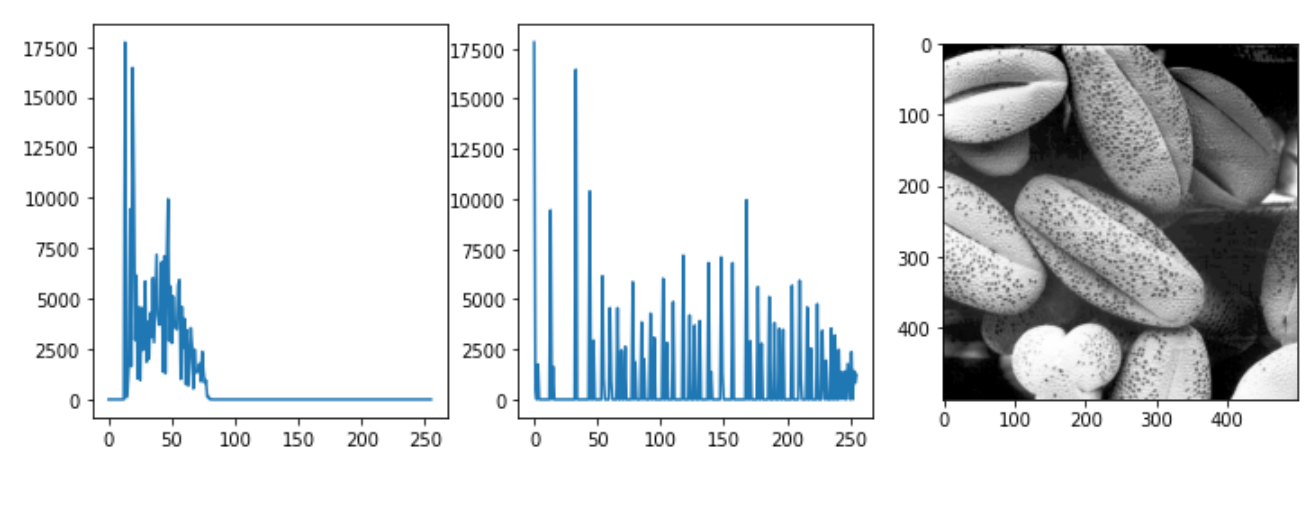
```
inp_img = cv.imread('shells.tif',cv.IMREAD_GRAYSCALE)

hist_inp = cv.calcHist([inp_img],[0],None,[256],[0,256])
equ_img = cv.equalizeHist(inp_img)
```

```
hist_equ = cv.calcHist([equ_img],[0],None,[256],[0,256])
fig,ax = plt.subplots(1,3,figsize=(12,4))
out_img = cv.cvtColor(equ_img,cv.COLOR_BGR2RGB)

ax[0].plot(hist_inp)
ax[1].plot(hist_equ)
ax[2].imshow(out_img)

plt.show()
```



4.

(a)

```
img = cv.imread('zion_pass.jpg', cv.IMREAD_COLOR).astype(np.float32) / 255.0
hlsImg = cv.cvtColor(img, cv.COLOR_BGR2HLS)
hlsImg[:, :, 2] = (1.0 + 500 / float(100)) * hlsImg[:, :, 2]
hlsImg[:, :, 2][hlsImg[:, :, 2] > 1] = 1
outImg = cv.cvtColor(hlsImg, cv.COLOR_HLS2RGB) * 255
outImg = outImg.astype(np.uint8)
nimg = cv.cvtColor(img,cv.COLOR_BGR2RGB)

fig, ax = plt.subplots(1, 2, figsize=(16,8))
ax[0].imshow(nimg)
ax[1].imshow(outImg)

plt.show()
```

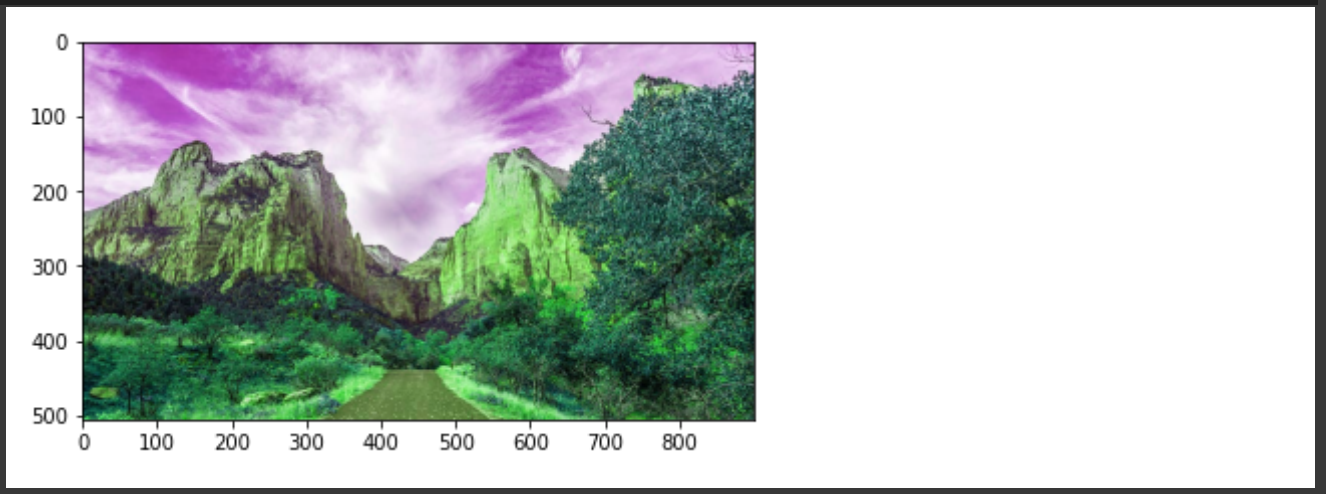
(b)

```
img = cv.imread('zion_pass.jpg', cv.IMREAD_COLOR).astype(np.uint8)
hsvimg = cv.cvtColor(img, cv.COLOR_BGR2HSV)
h,s,v = cv.split(hsvimg)

hnew = np.mod(h + 40, 180).astype(np.uint8)

hsv_new = cv.merge([hnew,s,v])
rgb_new = cv.cvtColor(hsv_new, cv.COLOR_HSV2RGB)
fig, ax = plt.subplots()
ax.imshow(rgb_new)

plt.show()
```



0s completed at 12:01 AM