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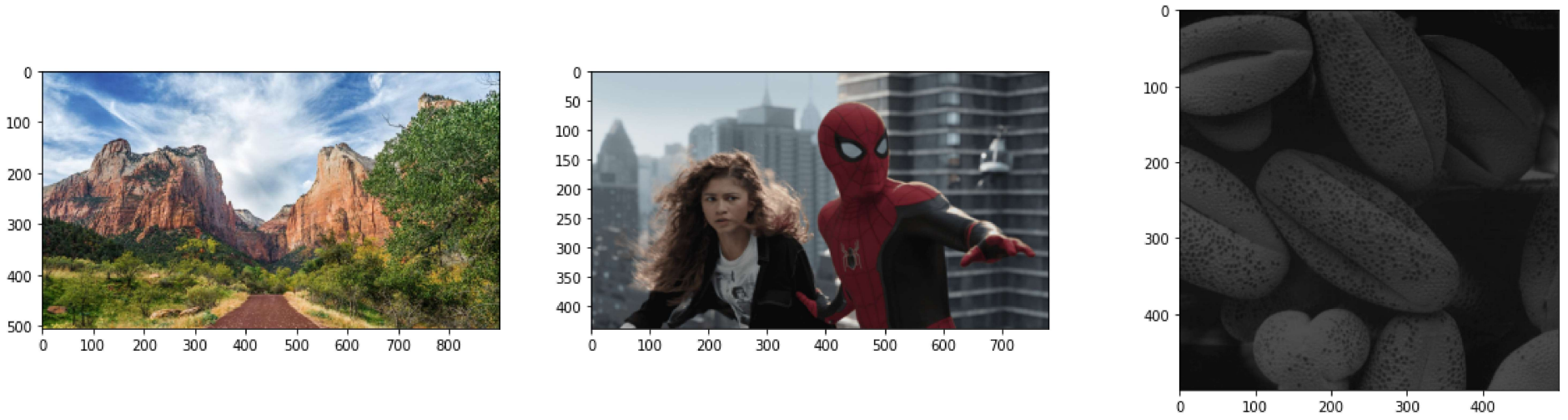
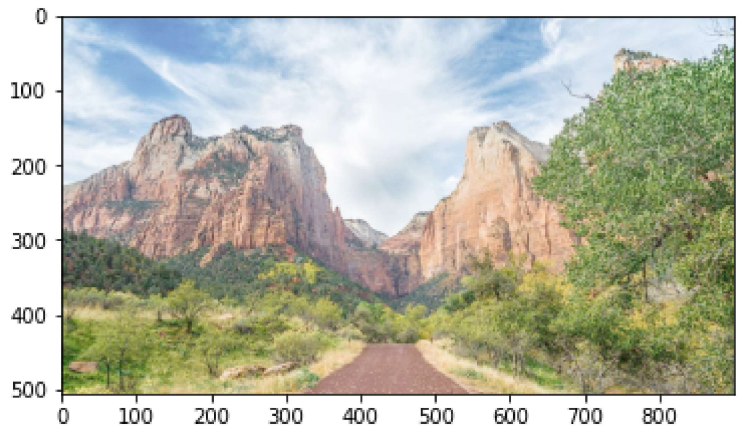
Index No : 190538N

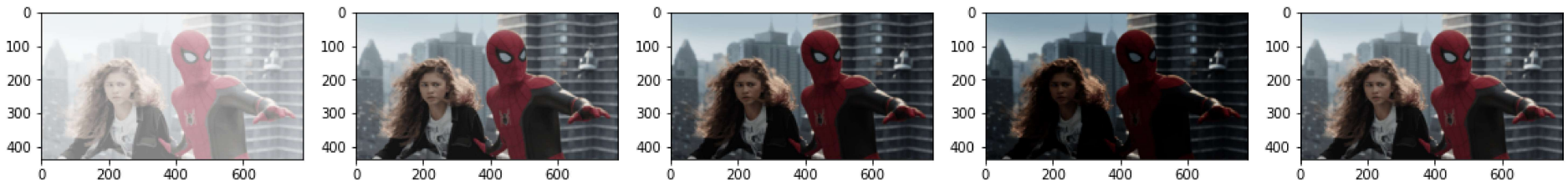
In [ ]:
```
%matplotlib inline
import cv2 as cv
import matplotlib.pyplot as plt
img1 = cv.imread('zion_pass.jpg')
img2 = cv.imread('spider.png')
img3 = cv.imread('shells.tif',0)


img1_1 = cv.cvtColor(img1,cv.COLOR_BGR2RGB)
img2_1 = cv.cvtColor(img2,cv.COLOR_BGR2RGB)
# img3_1 = cv.cvtColor(img3,cv.COLOR_BGR2GRAY)
f,ax = plt.subplots(1,3,figsize = [20,5])
ax[0].imshow(img1_1)
ax[1].imshow(img2_1)
ax[2].imshow(img3,cmap = 'gray',vmin =0,vmax =255)
# ax[0].set_title("")
plt.show()

cv.imshow("image",img3)
cv.waitKey(0)
cv.destroyAllWindows()
```



In [ ]:
```
#Gamma Correction
import numpy as np

gamma = 0.5
transform_gamma = np.array([(p/255 )**gamma*255 for p in range(0,256)]).astype(np.uint8)
fig,ax = plt.subplots()
# ax.plot(transform_gamma)
new_img = cv.LUT(img1_1,transform_gamma)
ax.imshow(new_img)
plt.show()
```

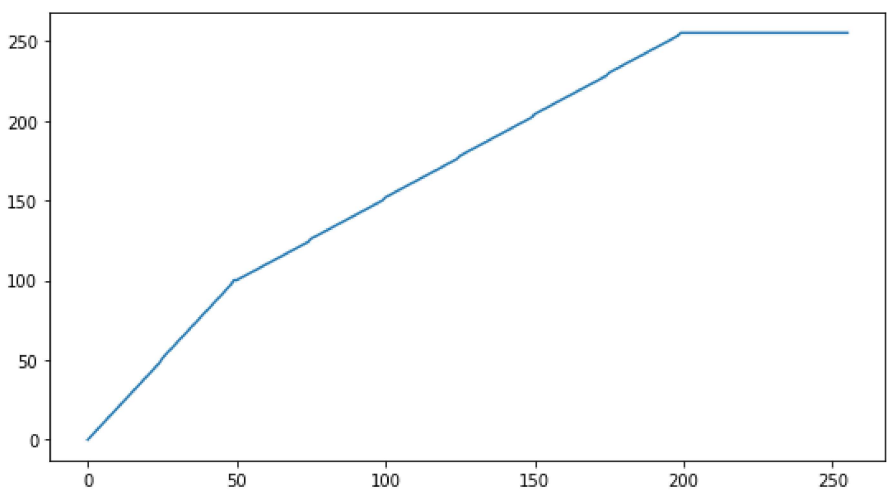


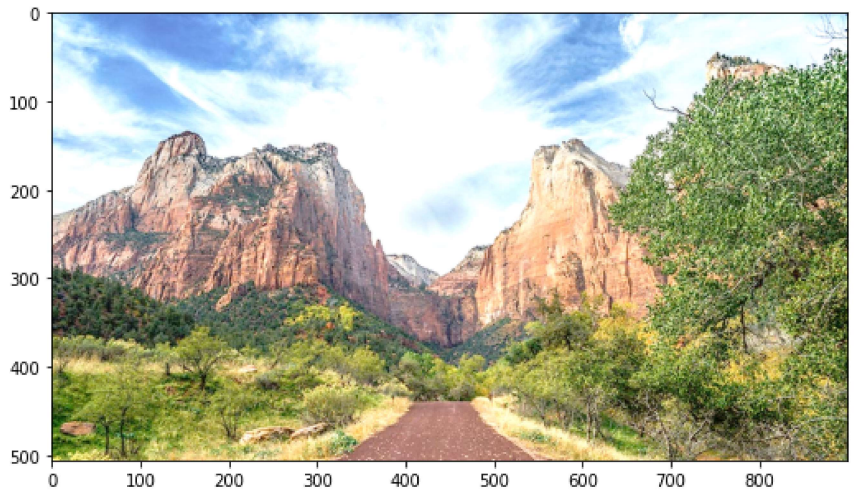
In [ ]:
```
#Gamma Correction
import numpy as np

gamma = [0.2,0.8,1.2,2,1]
i = 0
fig,ax = plt.subplots(1,5,figsize = [20,5])
for g in gamma:
    transform_gamma = np.array([((p/255 )**g)*255 for p in range(0,256)]).astype(np.uint8)
    # ax[i].plot(transform_gamma)
    new_img = cv.LUT(img2_1,transform_gamma)
    ax[i].imshow(new_img)
    i += 1
plt.show()
```



In [ ]:

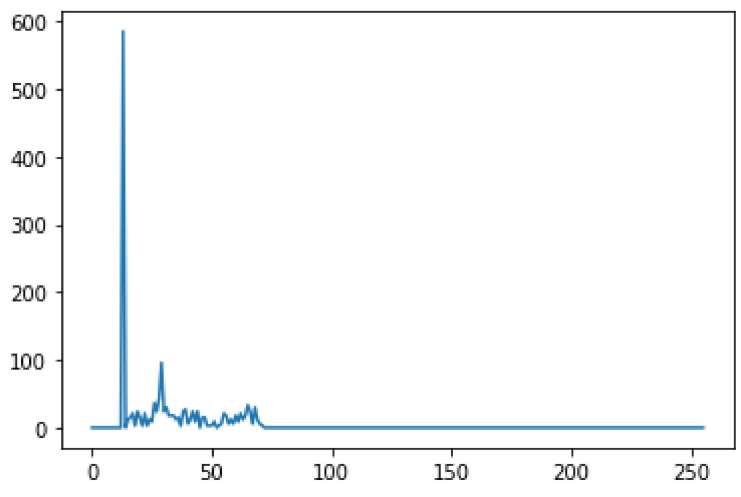
```
#Question 2
######method 2
t1 = np.linspace(0,100,50)
t2 = np.linspace(100,255,150)
t3 = np.linspace(255,255,56)

t = np.concatenate((t1,t2,t3),axis = 0).astype(np.uint8)
# fig,ax = plt.subplots()
# ax.plot(t)
# plt.show()

#######
# transform_1 = np.array([2*p for p in range(0,51)] + [1.033333*p + 50 for p in range(51,200)] + [255 for p in range(201,257)]).as
###############

fig,ax = plt.subplots(1,2,figsize = [20,5])
ax[0].plot(t)
new_img = cv.LUT(img1_1,t)
ax[1].imshow(new_img)
plt.show()
# cv.imshow("image",new_img)
# cv.waitKey(0)
# cv.destroyAllWindows()
```





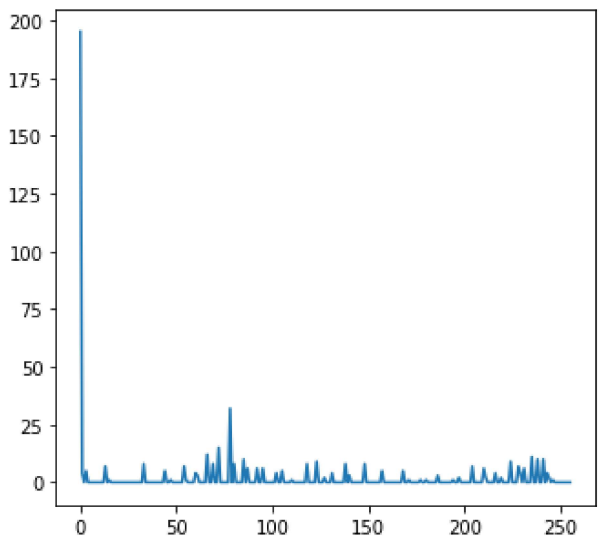
In [ ]:

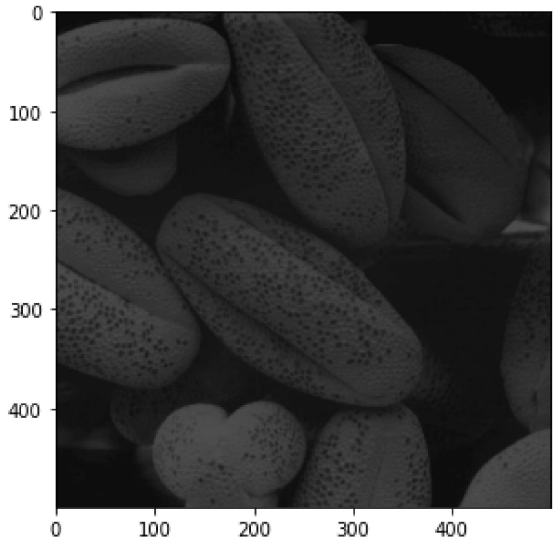
```
#Question 3
fig,ax = plt.subplots()
# ax.imshow(img3)
h = cv.calcHist(img3_1,[0],None,[256],[0,256])
ax.plot(h)
plt.show()
```

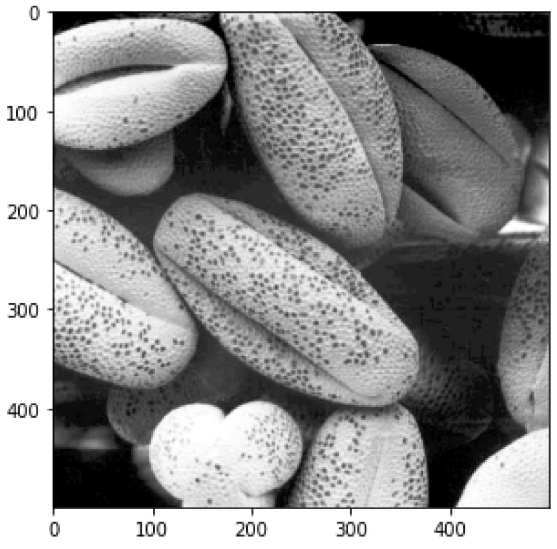


In [ ]:

```
#Q3 - b
assert img3 is not None
eq_img = cv.equalizeHist(img3)
fig,ax = plt.subplots(1,3,figsize = [18,5])
h = cv.calcHist(eq_img,[0],None,[256],[0,256])
ax[0].plot(h)
ax[1].imshow(img3,cmap = 'gray',vmin =0,vmax =255)
ax[2].imshow(eq_img,cmap = 'gray',vmin =0,vmax =255)
plt.show()
cv.imshow("image",img3)
cv.waitKey(0)

# cv.imshow("image",eq_img)
# cv.waitKey(0)
# cv.destroyAllWindows()
```

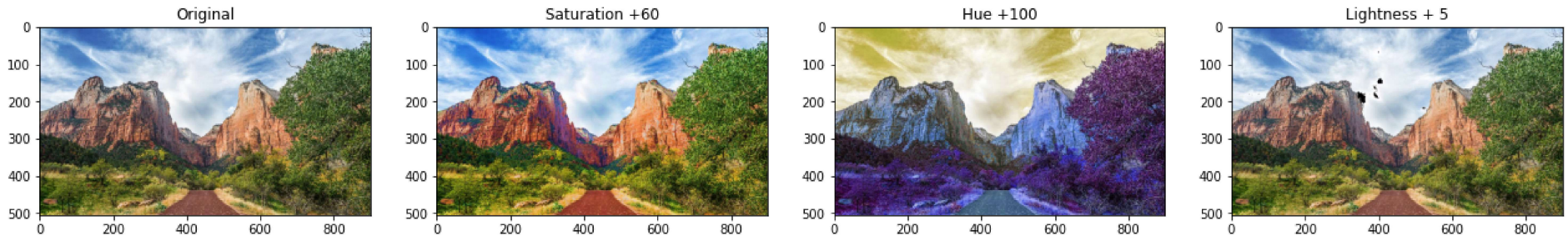






Out[ ]: -1

In [ ]:
```
#Q4
def cvHLS(saturation, hue, lightness):
    img_hsl = cv.cvtColor(img1,cv.COLOR_BGR2HLS)
    img_hsl[:,:,0] += hue
    img_hsl[:,:,1] += lightness
    img_hsl[:,:,2] += saturation
    img_out = cv.cvtColor(img_hsl,cv.COLOR_HLS2RGB)
    return img_out


fig,ax = plt.subplots(1,4,figsize=[22,5])
ax[0].imshow(cvHLS(0,0,0))
ax[0].set_title("Original")

ax[1].imshow(cvHLS(60,0,0))
ax[1].set_title("Saturation +60")

ax[2].imshow(cvHLS(0,100,0))
ax[2].set_title("Hue +100")

ax[3].imshow(cvHLS(0,0,5))
ax[3].set_title("Lightness + 5")

plt.show()

# cv.imshow("image",img_hsl)
# cv.waitKey(0)
# cv.destroyAllWindows()
```

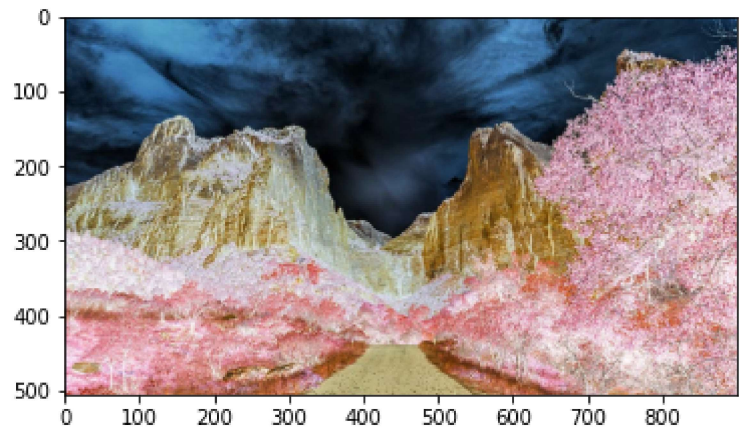


In [ ]:

Out[ ]:
```
array([[1, 7],
       [1, 8]])
```

Inclass Activities

In [ ]:
```
transform = np.arange(0, 256).astype('uint8')
transform = np.arange(255,-1,-1,dtype=np.uint8)
fig,ax = plt.subplots()
# ax.plot(transform)
new_img = cv.LUT(img1,transform)
ax.imshow(new_img)
plt.show()
```



In [ ]:
```
transform1 = np.arange(255,-1,-1,dtype=np.uint8)
fig,ax = plt.subplots()
ax.plot(transform1)
plt.show()
```