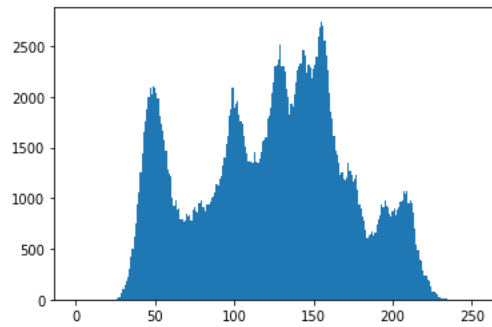


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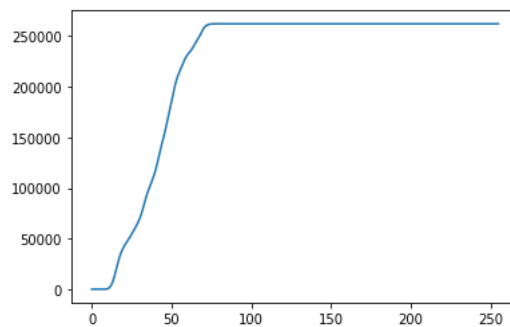
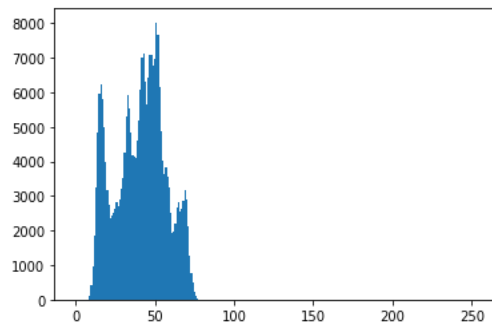
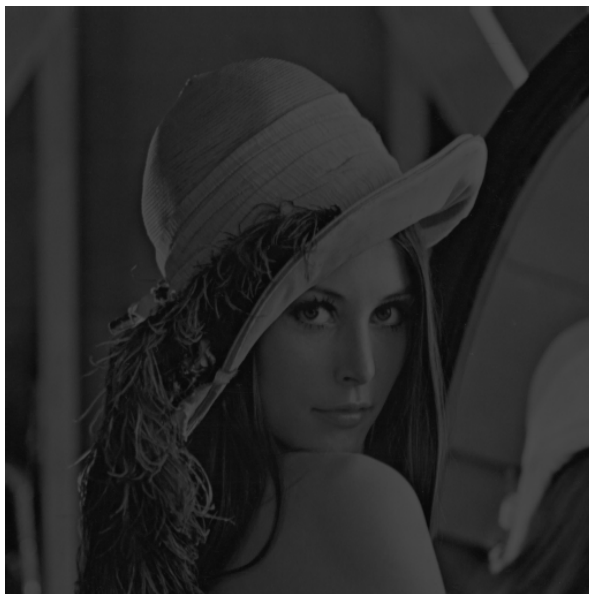
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(a) original image and its histogram



```
#(a)original histogram
m=[0]*256
for i in range(512):
    for j in range(512):
        m[lena_arr[i][j]]+=1
plt.bar(x=[i for i in range(256)],height=m,width=1)
```

(b) image with intensity divided by 3 and its histogram (and its cdf)



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```
#(b) 1/3
HW3_b=np.array([[i//3 for i in j] for j in lena_arr],dtype='uint8')
mb=[0]*256
for i in range(512):
    for j in range(512):
        mb[HW3_b[i][j]]+=1
plt.bar(x=[i for i in range(256)],height=mb,width=1)
cdf=[mb[0]]*256
for i in range(1,256):
    cdf[i]=mb[i]+cdf[i-1]
plt.plot(cdf)
```

(c) image after applying histogram equalization to (b) and its histogram (and its cdf)
Using my own simple algorithm ,without formula.

```
 #(c) histogram equalization
step=(512*512)//256
bound=step
newcdf=[0]*256
idx=0
d={}
while newcdf[0]<bound:
    newcdf[0]+=mb[idx]
    d[idx]=0
    idx+=1

for i in range(1,256):
    newcdf[i]=newcdf[i-1]
    bound+=step
    while newcdf[i]<bound:
        newcdf[i]+=mb[idx]
        d[idx]=i
        idx+=1
while idx<256:
    newcdf[i]+=mb[idx]
    d[idx]=i
    idx+=1

lenac=np.array([[d[i] for i in j] for j in HW3_b],dtype='uint8')
newm=[0]*256
for i in range(512):
    for j in range(512):
        newm[lenac[i][j]]+=1
plt.bar([i for i in range(256)],newm,width=1)
plt.plot(newcdf)
```

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