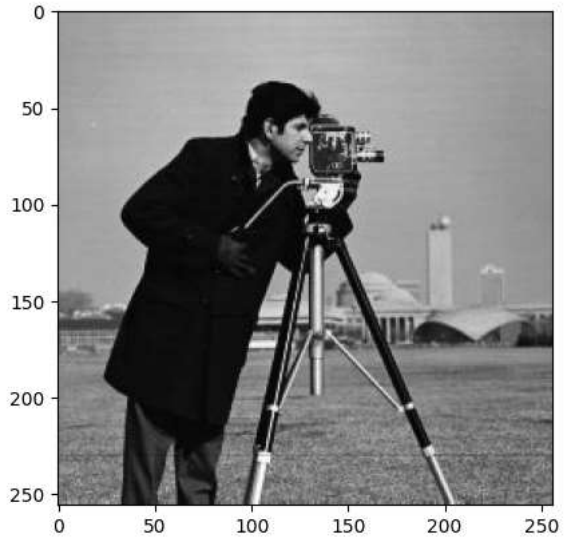
```
import cv2
import numpy as np
import matplotlib.pyplot as plt

img = cv2.imread("/content/cameraman123.jpg",0)


plt.imshow(img,"gray")
```

```
<matplotlib.image.AxesImage at 0x7e14f7e916f0>
```



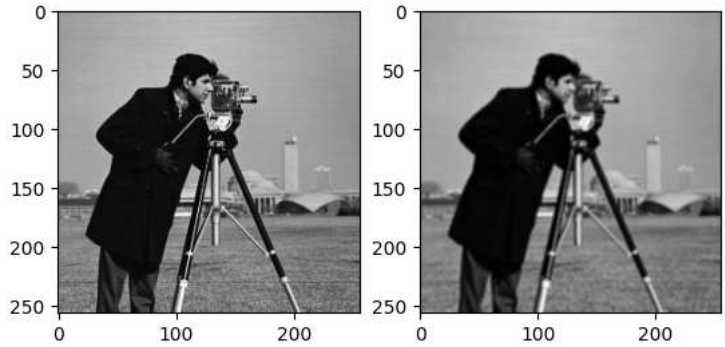

```
# Smoothing/low-pass filter kernel
kernel = np.ones((3,3),np.float32)/9
kernel
```

```
array([[0.11111111, 0.11111111, 0.11111111],
       [0.11111111, 0.11111111, 0.11111111],
       [0.11111111, 0.11111111, 0.11111111]], dtype=float32)
```

```
avg_img = cv2.filter2D(img,-1,kernel)


plt.subplot(121), plt.imshow(img,'gray')
plt.subplot(122), plt.imshow(avg_img,'gray')
```

```
(<Axes: >, <matplotlib.image.AxesImage at 0x7e14f82ab8e0>)
```




```
#Create the sharpening kernel
kernel1 = np.array([[-1,-1,-1], [-1,9,-1], [-1,-1,-1]])
kernel1
```

```
array([[-1, -1, -1],
       [-1,  9, -1],
       [-1, -1, -1]])
```

Double-click (or enter) to edit

```
sharp_img = cv2.filter2D(avg_img,-1,kernel1)


plt.figure(figsize=(10,6))
plt.subplot(131), plt.imshow(img,'gray'), plt.title("Original image"), plt.axis("off")
plt.subplot(132), plt.imshow(avg_img,'gray'), plt.title("Low pass filtered image"), plt.axis("off")
plt.subplot(133), plt.imshow(sharp_img,'gray'), plt.title("Sharpened image"), plt.axis("off")
```

```
(<Axes: title={'center': 'Sharpened image'}>,
 <matplotlib.image.AxesImage at 0x7e14e5accd60>,
 Text(0.5, 1.0, 'Sharpened image'),
 (-0.5, 255.5, 255.5, -0.5))
```