Note: I am Using Scipy v1.1.0. In case of any errors you can install scipy 1.1.0 by the following command: pip install scipy==1.1.0

In [14]:
```
import scipy
scipy.__version__
```

Out[14]:
```
'1.1.0'
```

To download images Click on this url: https://drive.google.com/drive/folders/1pcaTwofZGfoCxZ3Hv2X6vW6xf_1i88eb?usp=sharing (https://drive.google.com/drive/folders/1pcaTwofZGfoCxZ3Hv2X6vW6xf_1i88eb?usp=sharing)

Import Libraries

In [1]:
```
import numpy as np
from scipy.misc import imread, imresize
from scipy import ndimage
import matplotlib.pyplot as plt
from scipy import signal
from skimage.color import rgb2gray
```

Reading Image

In [2]:
```
greyscale_image =imread('camera.png',False, 'L')    #read image as grey scale image
greyscale_image =greyscale_image.astype(np.int32)
```

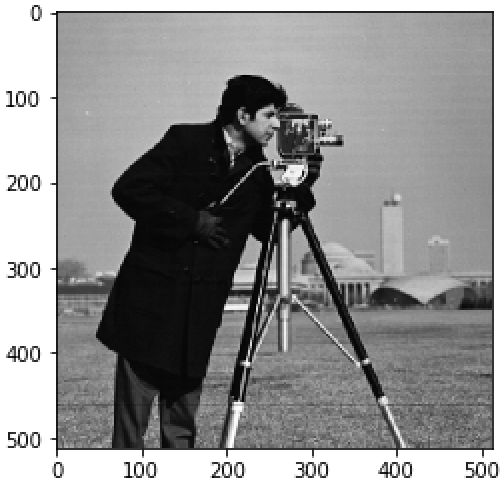
```
C:\ProgramData\Anaconda3\lib\site-packages\ipykernel_launcher.py:1: DeprecationWarning: `imread` is deprecate
d!
`imread` is deprecated in SciPy 1.0.0, and will be removed in 1.2.0.
Use ``imageio.imread`` instead.
  """Entry point for launching an IPython kernel.
```

In [3]:

```
plt.imshow(greyscale_image,plt.cm.gray)
```

Out[3]:

```
<matplotlib.image.AxesImage at 0x224b2c3da48>
```



1. Identity Mask

In [4]:

```
id_mask = np.zeros((3,3),dtype=np.int32)
index=int(id_mask.size/2)+1
row=int(index/id_mask.shape[0])
col=int(index/id_mask.shape[1])
#print(row,col)
id_mask[row,col]=1
print(id_mask)
```

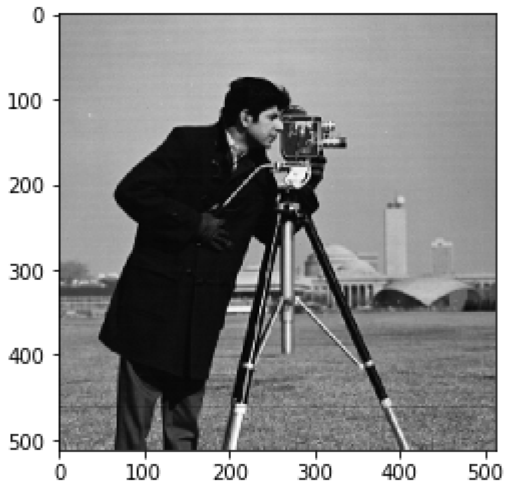
```
[[0 0 0]
 [0 1 0]
 [0 0 0]]
```

In [5]:

```
identity_mask=ndimage.convolve(greyscale_image.copy(), id_mask, mode='constant', cval=0.0)
```

In [6]:
```
plt.imshow(identity_mask,plt.cm.gray)
```

Out[6]:
```
<matplotlib.image.AxesImage at 0x224b2e16308>
```



2. Sharp Mask

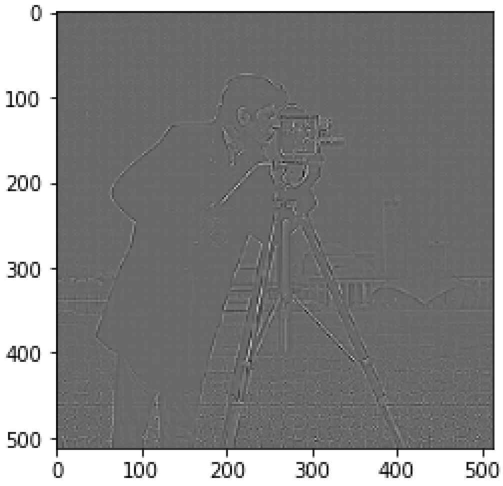
In [7]:
```
sharp_mask= np.array([[0,-1,0],[-1,4,-1],[0,-1,0]])
print(sharp_mask)
```

```
[[ 0 -1  0]
 [-1  4 -1]
 [ 0 -1  0]]
```

In [8]:
```
sharp_mask=ndimage.convolve(greyscale_image.copy(), sharp_mask, mode='constant', cval=0.0)
```

In [9]:
```
plt.imshow(sharp_mask,plt.cm.gray)
```

Out[9]:
```
<matplotlib.image.AxesImage at 0x224b2e80f48>
```



3. Gaussian Mask

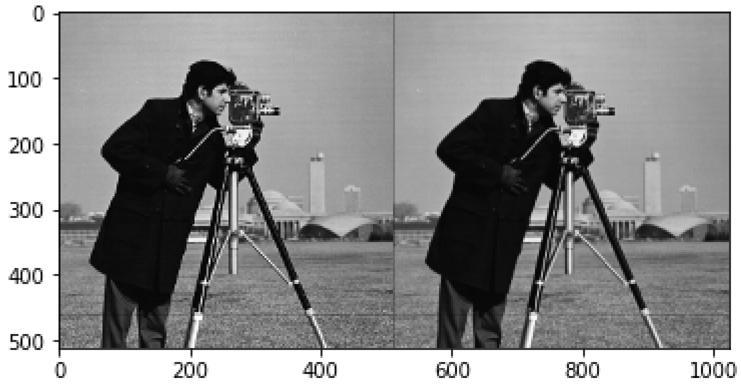
In [10]:
```
gm = np.array([[1/16,2/16,1/16],[2/16,4/16,2/16],[1/16,2/16,1/16]])
print(gm)
```

```
[[0.0625 0.125  0.0625]
 [0.125  0.25   0.125 ]
 [0.0625 0.125  0.0625]]
```

In [11]:
```
gm_mask=ndimage.convolve(greyscale_image.copy(), gm, mode='constant', cval=0.0)
```

```
In [12]: a=np.hstack((greyscale_image.copy(),gm_mask))
         plt.imshow(a,plt.cm.gray)
```

```
Out[12]: <matplotlib.image.AxesImage at 0x224b2eed348>
```



4. Enhancement Filter

```
In [13]: ef= np.full((3,3),-1)
         ef[1,1]=9
         print(ef)
```

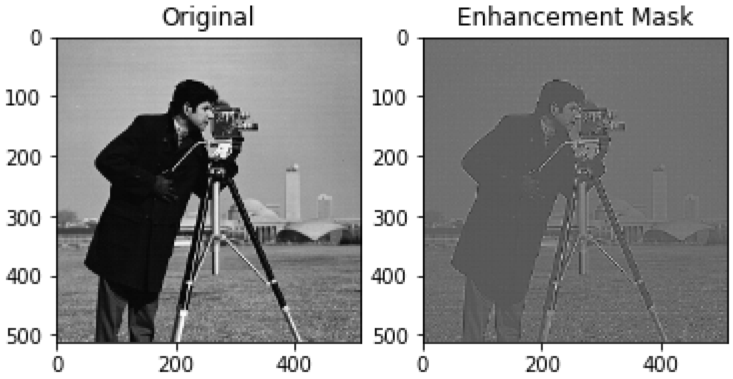
```
[[-1 -1 -1]
 [-1  9 -1]
 [-1 -1 -1]]
```

```
In [14]: ef_mask=ndimage.convolve(greyscale_image.copy(),ef, mode='constant', cval=0.0)
```

In [18]:

```
fig, axes = plt.subplots(1, 2)
ax = axes.ravel()

ax[0].imshow(greyscale_image,cmap=plt.cm.gray)
ax[0].set_title("Original")
ax[1].imshow(ef_mask, cmap=plt.cm.gray)
ax[1].set_title("Enhancement Mask")
plt.imshow(ef_mask,cmap=plt.cm.gray)
plt.show()
```



5. gradient filter prewitt

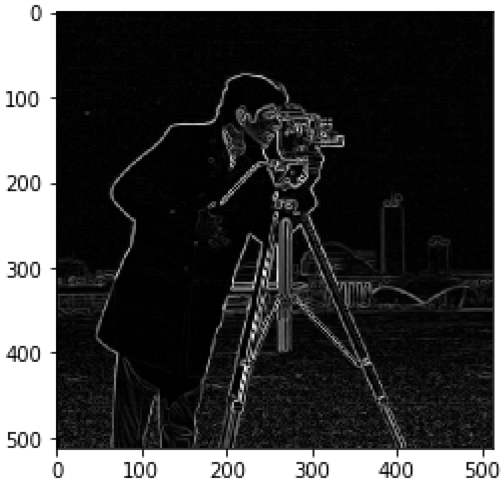
In [25]:

```
from skimage import data
from skimage import filters
```

In [26]:
```
camera = data.camera() # data you can choose your own data too
```

In [27]:
```
edges = filters.prewitt(camera)
plt.imshow(edges,cmap=plt.cm.gray)
```

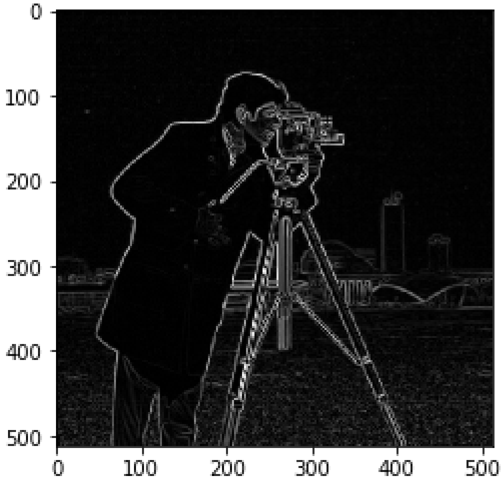
Out[27]:
```
<matplotlib.image.AxesImage at 0x22498d943c8>
```



6. gradient filter Sobel

```
In [28]: edges = filters.sobel(camera)
         plt.imshow(edges,cmap=plt.cm.gray)

Out[28]: <matplotlib.image.AxesImage at 0x22498ed1048>
```



7. Laplace

In [29]:

```
edges = filters.laplace(camera)
plt.imshow(edges,cmap=plt.cm.gray)
```

Out[29]:

```
<matplotlib.image.AxesImage at 0x22498f2b888>
```