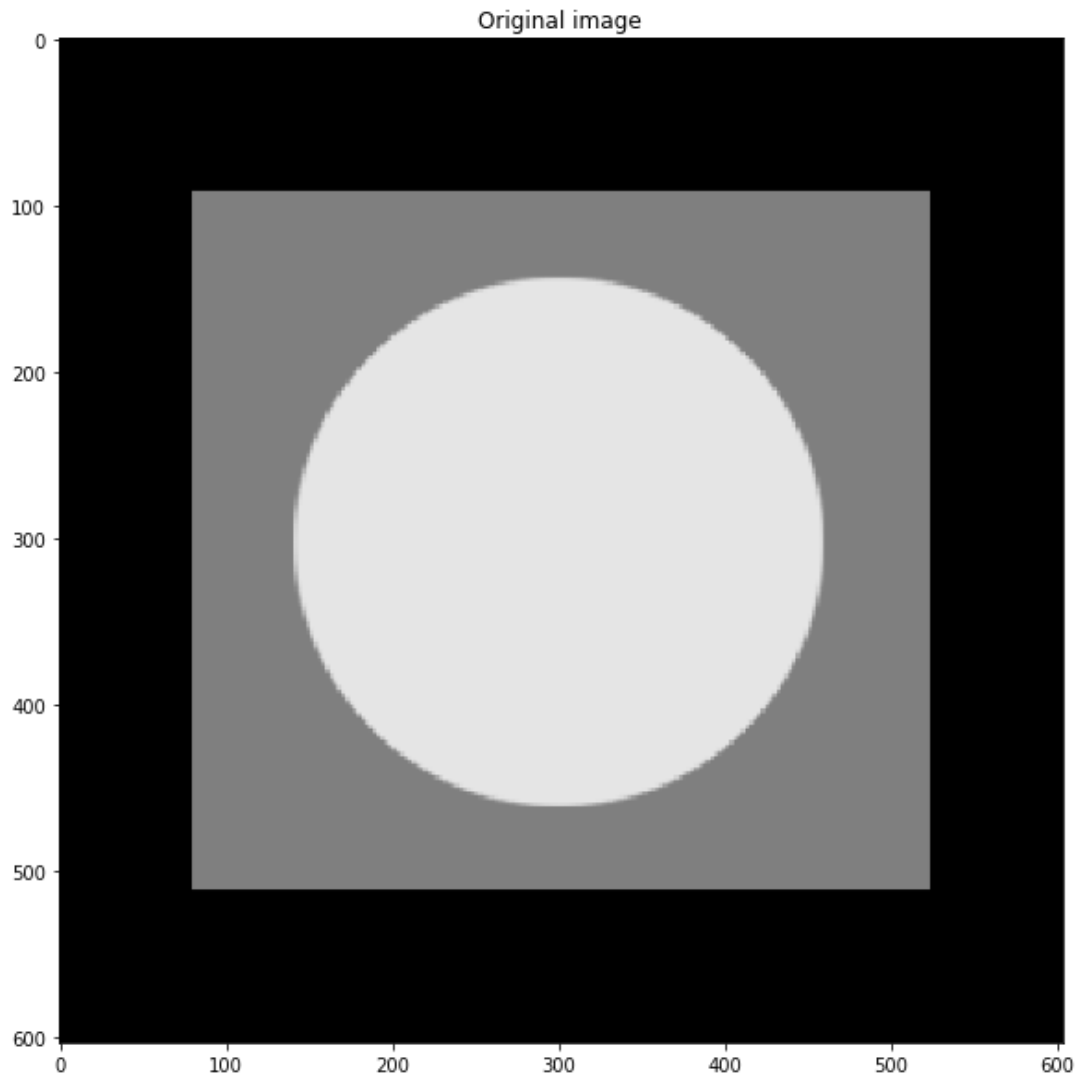
In [ ]:

```
%matplotlib inline
from IPython.display import display, Math, Latex
import cv2
import random
import numpy as np
import matplotlib.pyplot as plt
import requests
from PIL import Image
from io import BytesIO

url = 'https://media.cheggcdn.com/media%2F2a9%2F2a90c92c-db23-4c83-ad8a-ae394c72a576%2Fphp2bN8Kd.png'
response = requests.get(url)
img = Image.open(BytesIO(response.content)).convert('L')

# display the image
figsize = (10,10)
plt.figure(figsize=figsize)

plt.imshow(img, cmap='gray', vmin=0, vmax=255)
plt.title("Original image")
```

Out[ ]:

```
Text(0.5, 1.0, 'Original image')
```



In [27]:

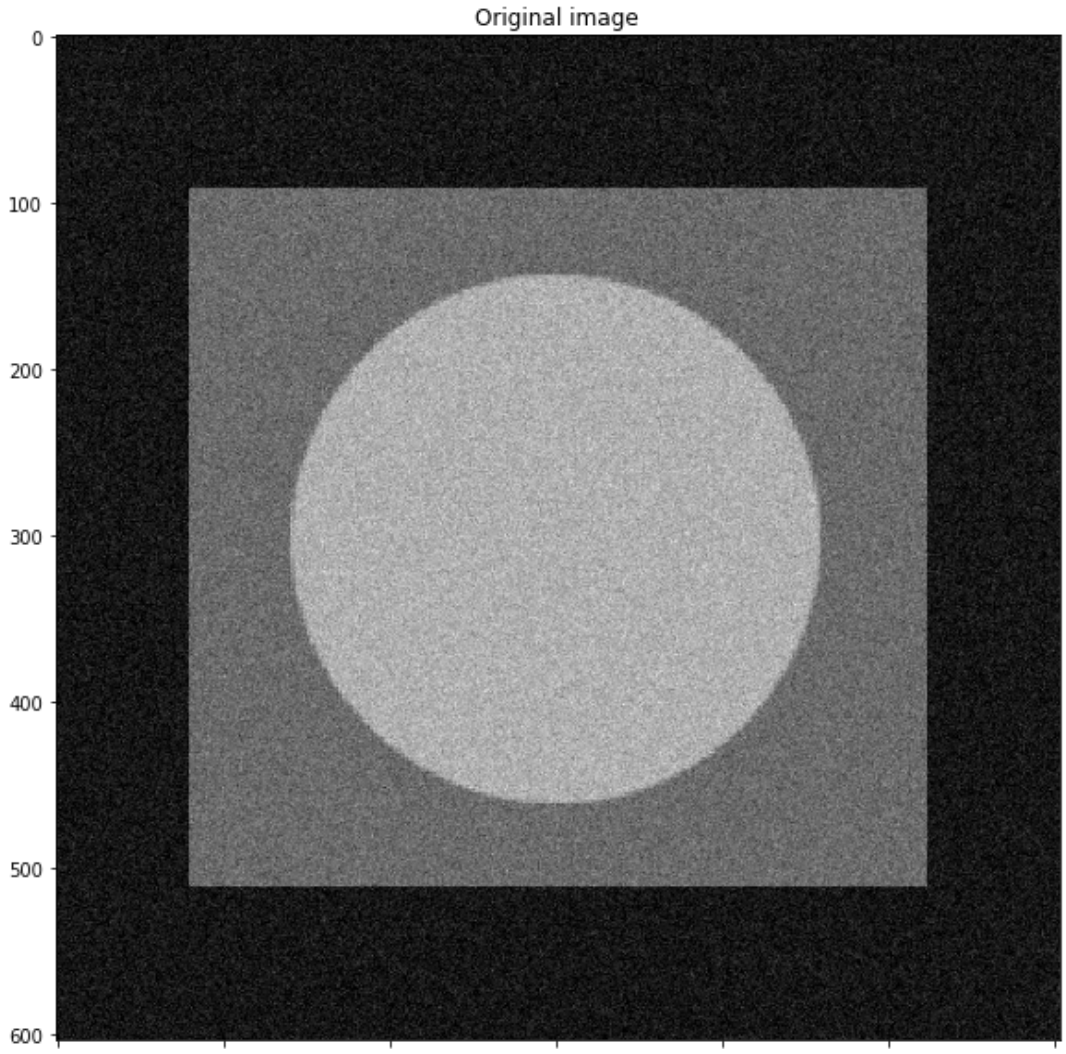
```
def rayleigh_distribution_noise(img):
  rayleigh = np.random.normal(8, 27, (img.shape[0],img.shape[1]))
  noisy_image = np.zeros(img.shape, np.float32)
  if len(img.shape) == 2:
    noisy_image = img + rayleigh
  else:
    noisy_image[:, :, 0] = img[:, :, 0] + rayleigh
    noisy_image[:, :, 1] = img[:, :, 1] + rayleigh
    noisy_image[:, :, 2] = img[:, :, 2] + rayleigh
  cv2.normalize(noisy_image, noisy_image, 0, 255, cv2.NORM_MINMAX, dtype=-1)
  noisy_image = noisy_image.astype(np.uint8)
  alpha = -30
  beta = 30
  noisy_image = np.int16(noisy_image)
  noisy_image = noisy_image * (beta/127+1) - beta + alpha
  noisy_image = np.clip(noisy_image, 0, 255)
  noisy_image = np.uint8(noisy_image)
  return noisy_image
```

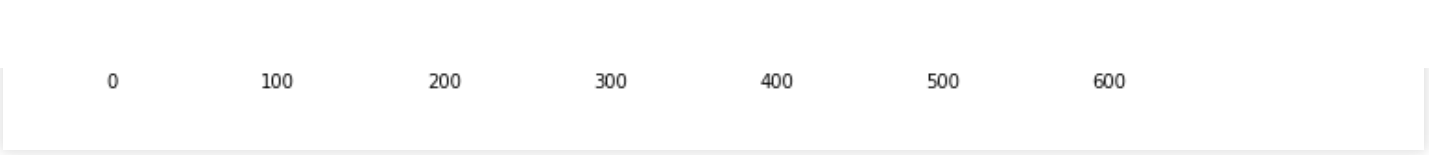
In [28]:

```
img = np.asarray(img)
noise_image = rayleigh_distribution_noise(img)

# display the image
figsize = (10,10)
plt.figure(figsize=figsize)

plt.imshow(noise_image, cmap='gray', vmin=0, vmax=255)
plt.title("Original image")
```

Out[28]:

```
Text(0.5, 1.0, 'Original image')
```




0
100
200
300
400
500
600