Assignment 5 Question 3 Report

Sai Gaurav Anugole 170070008
Titas Chakraborty 170070019
Jayesh Choudhary 170070038

September 2019

1 Original Image

The original image and its Fourier Transform in log magnitude are shown below.

Figure 1: Original Image

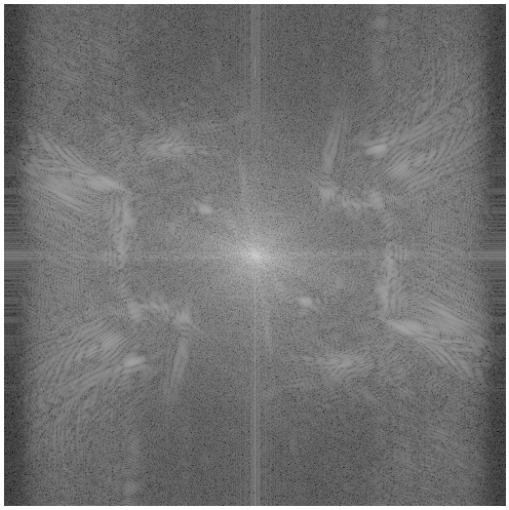

Figure 2: Fourier Transform with log magnitude

2 Low Pass Filtering

2.1 Output

Here we pass the image through an ideal low pass filter of variable cut off frequency.

Figure 3: Low pass filter frequency response and output image for cut off frequency=40

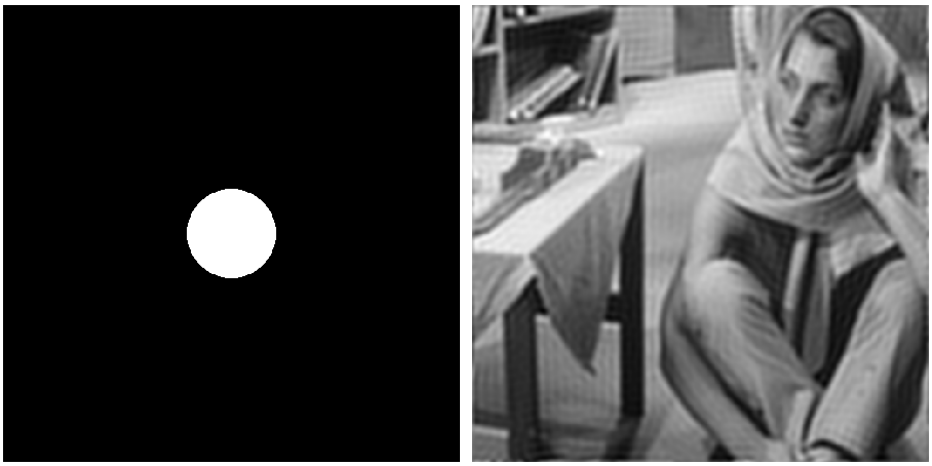

Figure 4: Low pass filter frequency response and output image for cut off frequency=50

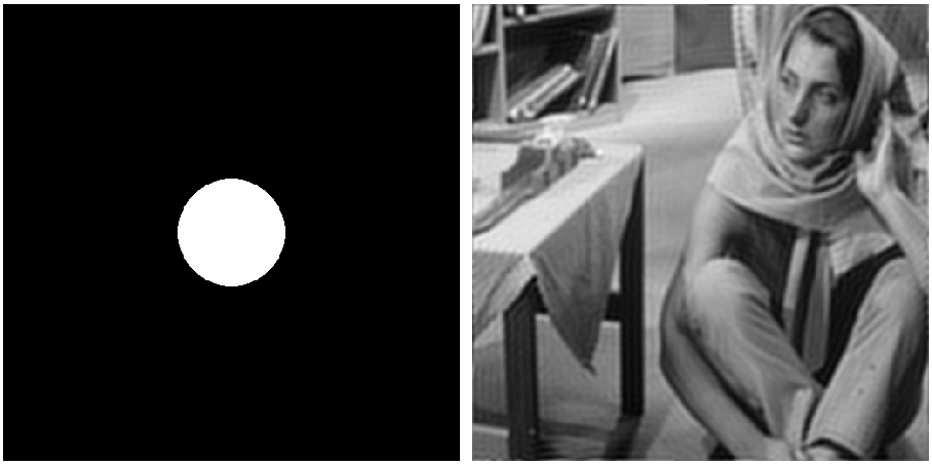

Figure 5: Low pass filter frequency response and output image for cut off frequency=60

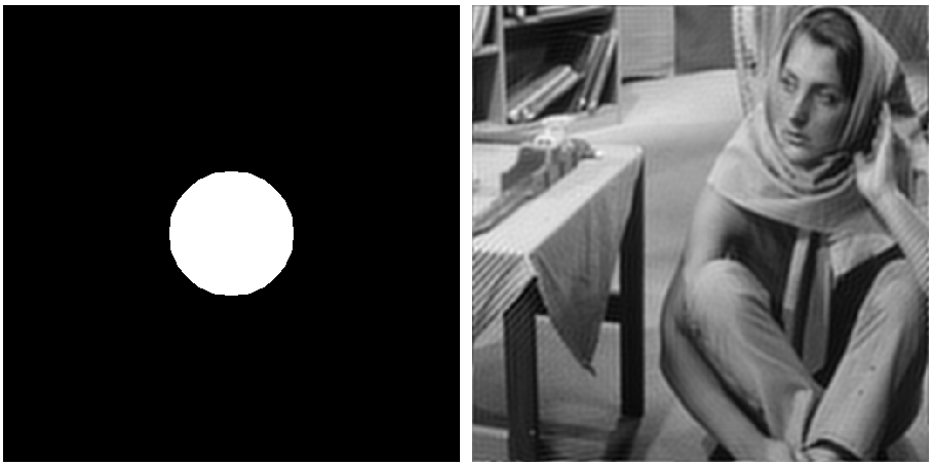

Figure 6: Low pass filter frequency response and output image for cut off frequency=70

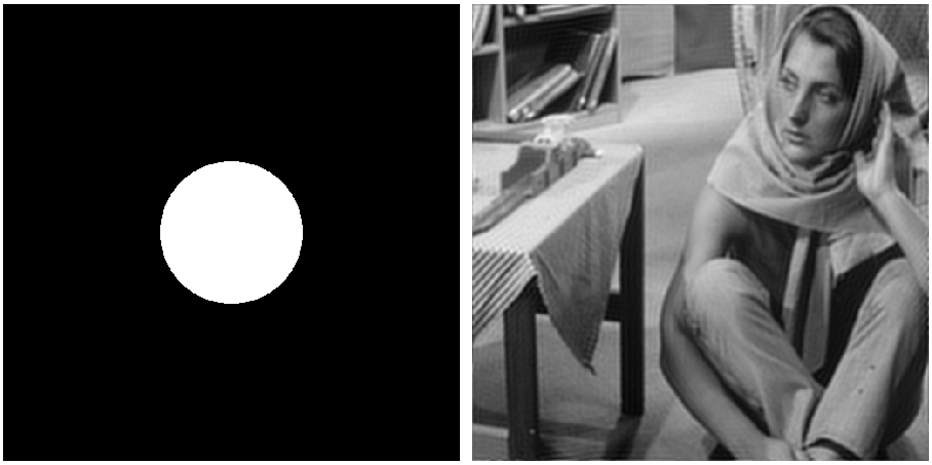

Figure 7: Low pass filter frequency response and output image for cut off frequency=80

2.2 Results

- At a cut off frequency of 40, we can see that the image is highly blurred as is expected. However, ringing artifacts are clearly visible in the image.
- As we increase the cut off frequency, the blurring becomes lower and lower and the ringing artifacts decrease.
- The image with cut off frequency of 80 is virtually indistinguishable from the original image.

3 Gaussian filtering

3.1 Output

Here we pass the image through a Gaussian filter of variable cut off frequency.

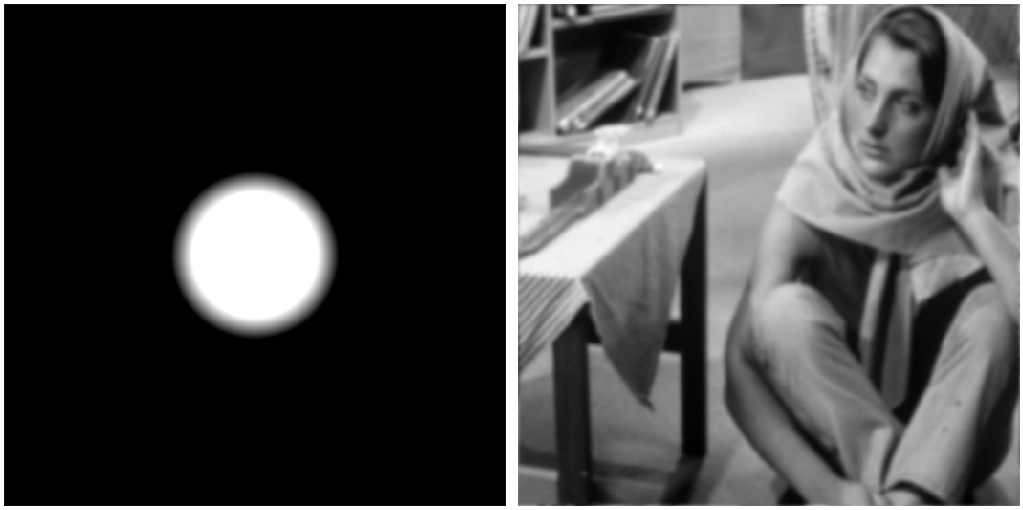

Figure 8: Gaussian filter frequency response and output image for cut off frequency=40

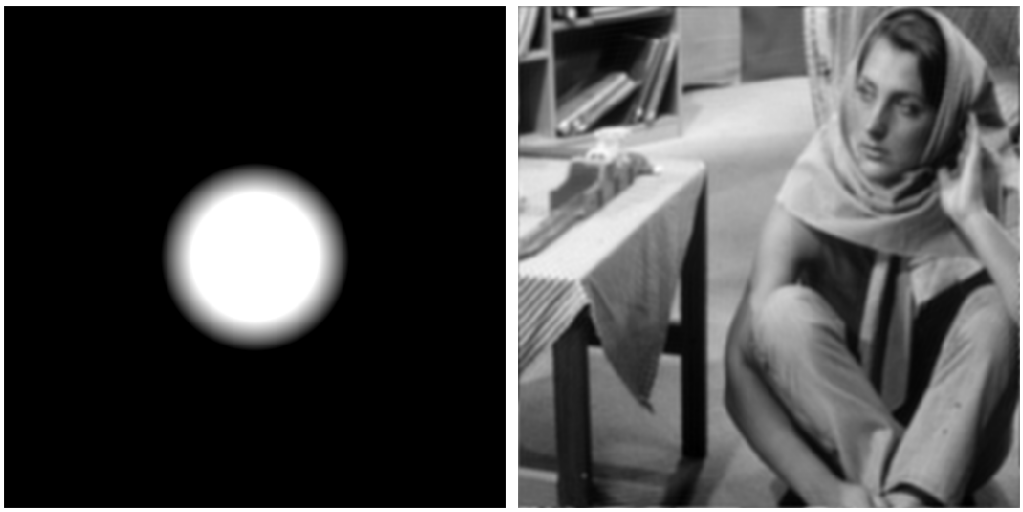

Figure 9: Gaussian filter frequency response and output image for cut off frequency=50

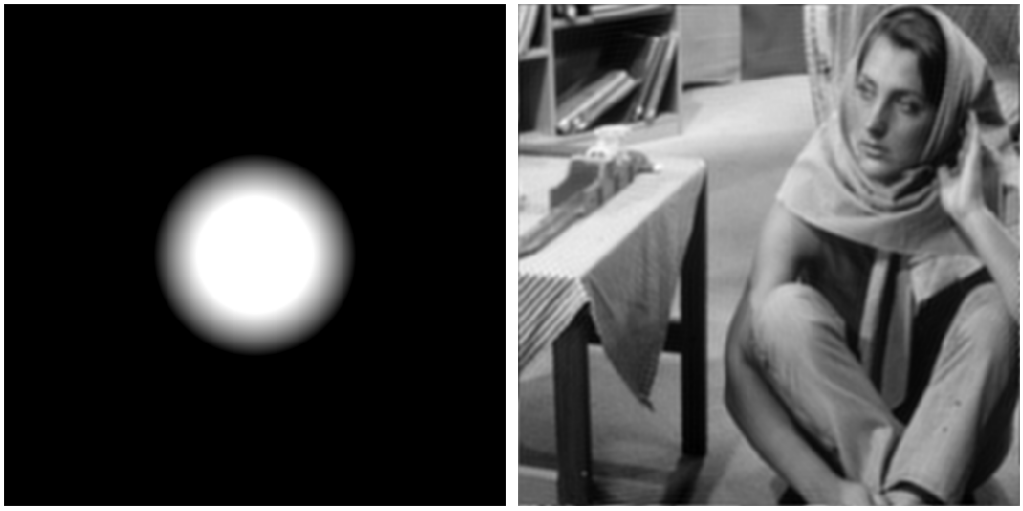

Figure 10: Gaussian filter frequency response and output image for cut off frequency=60

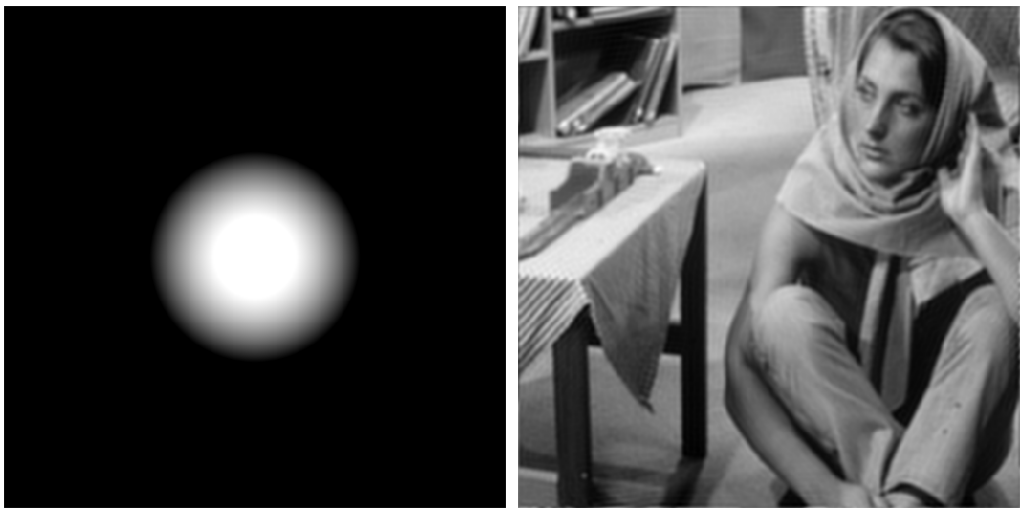

Figure 11: Gaussian filter frequency response and output image for cut off frequency=70

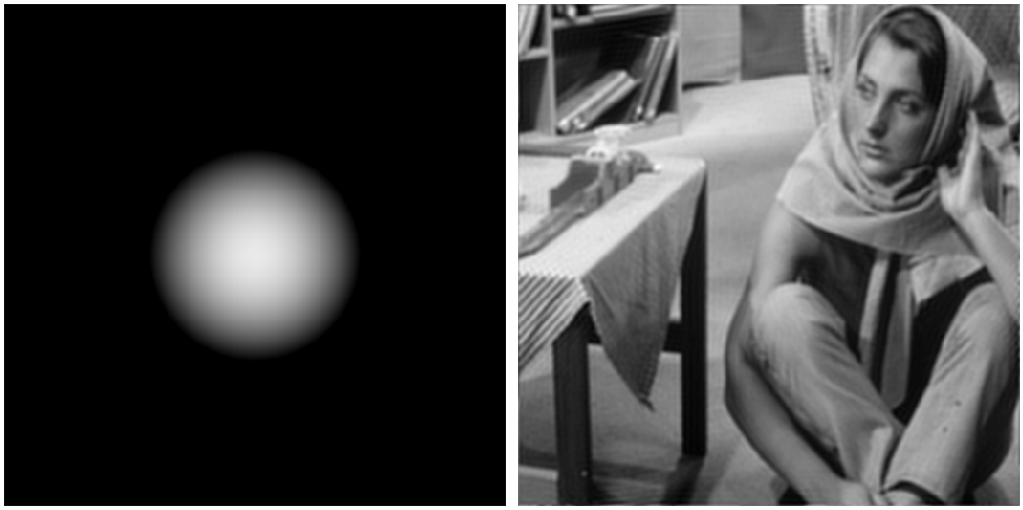

Figure 12: Gaussian filter frequency response and output image for cut off frequency=80

3.2 Results

- At a cut off frequency of 40, we can see that the image is blurred but not as much as by low pass filtering. Ringing artifacts are not visible.
- As we increase the cut off frequency, the blurring becomes lower and lower.
- The image with cut off frequency of 80 is virtually indistinguishable from the original image.