

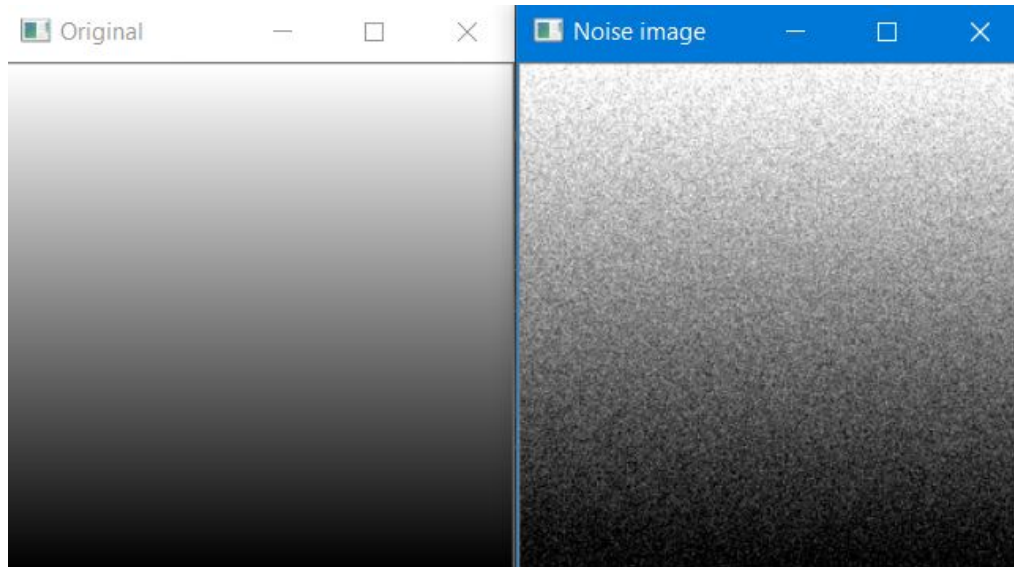
249113 Marek Antoszewski

Lab 5

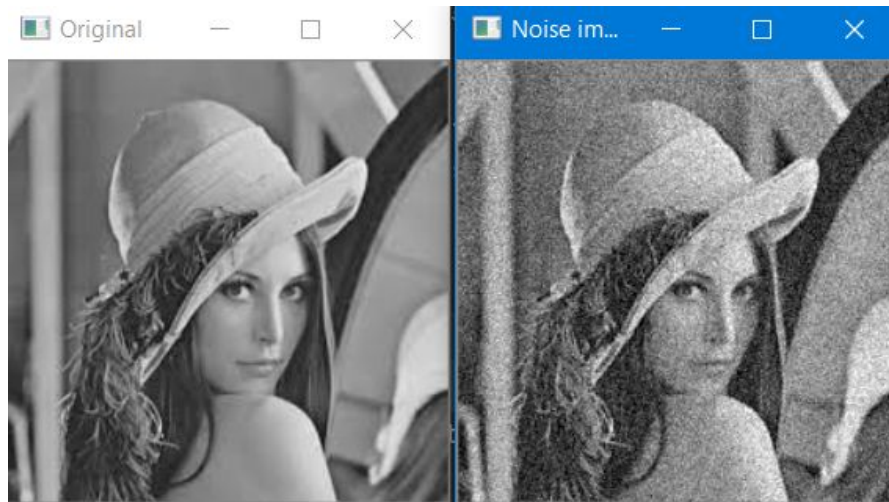
Task 1:

Perform filtering of Gaussian noise, and sharpening

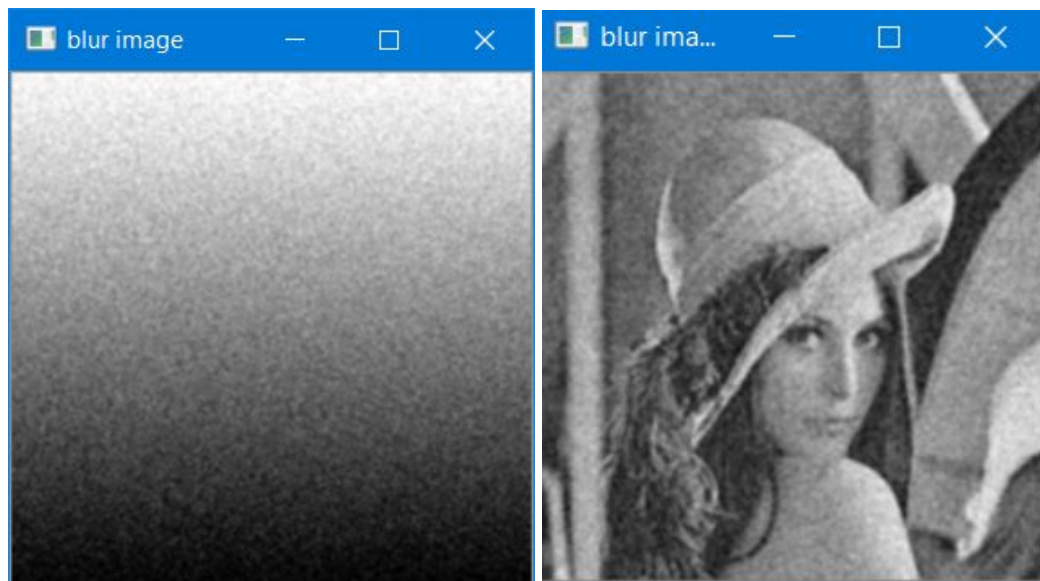
Low Frequency



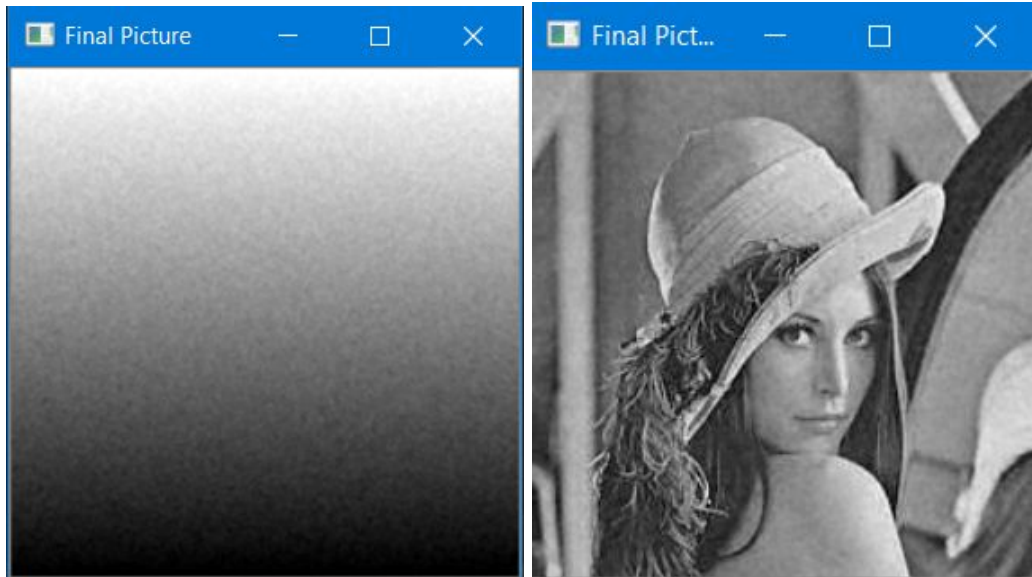
High Frequency



Filtering

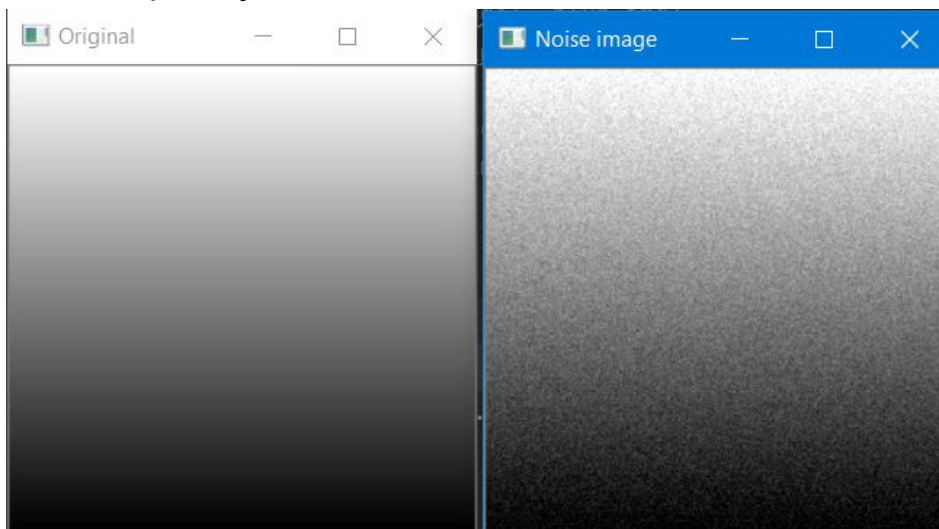


Sharpening

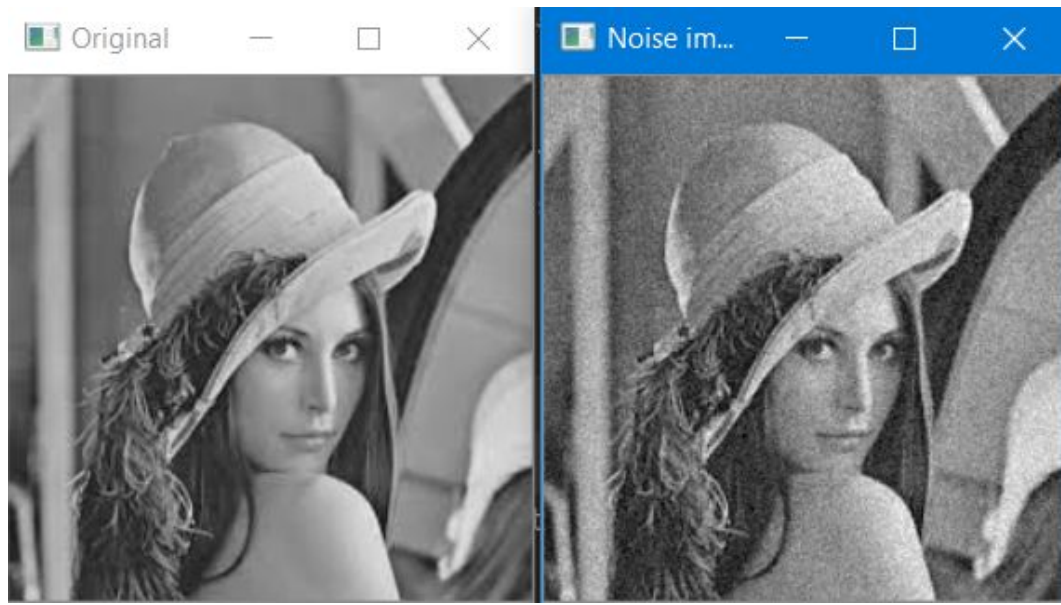


Standard Deviation = 0.05

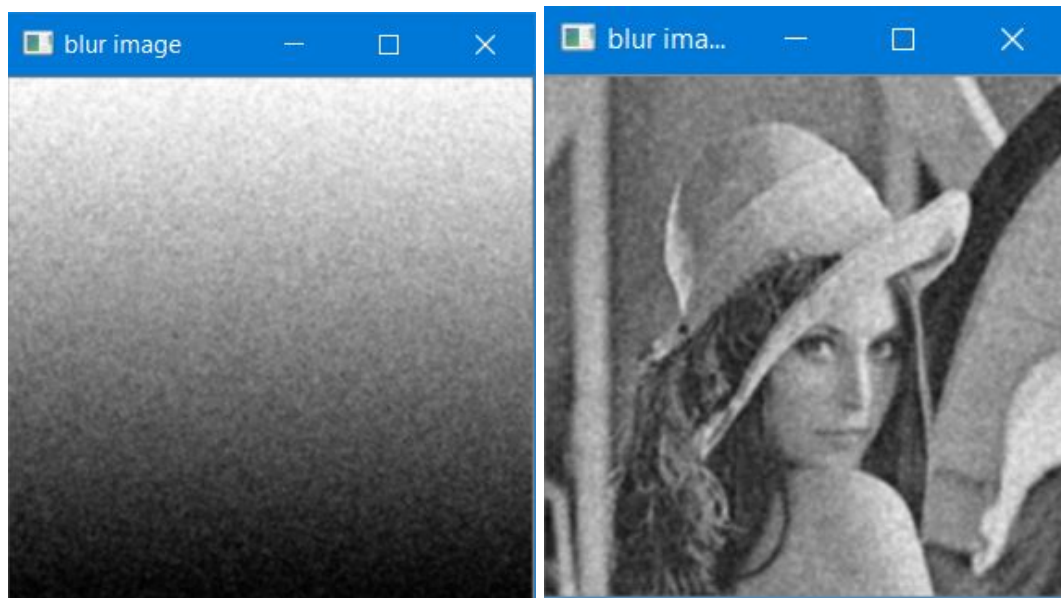
Low Frequency



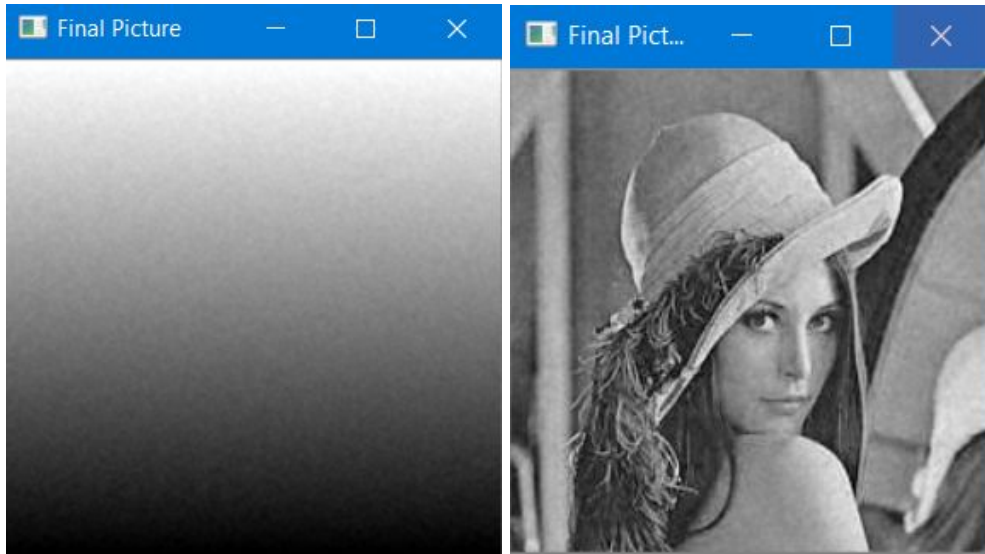
High Frequency



Filtering



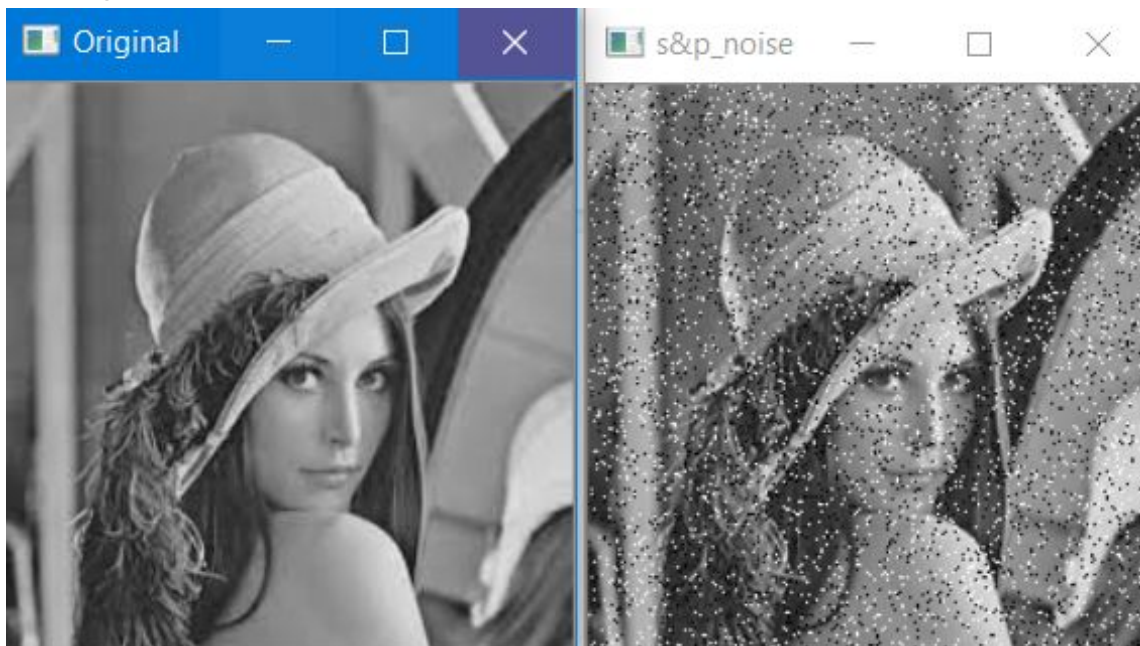
Sharpening

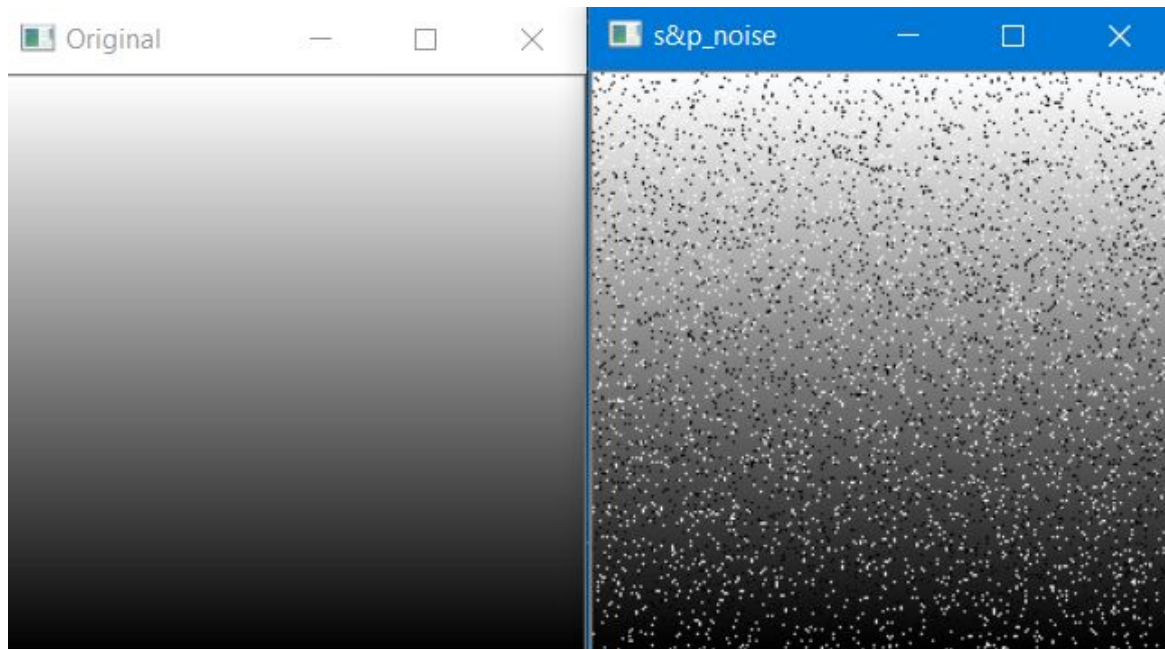


Task 2:-

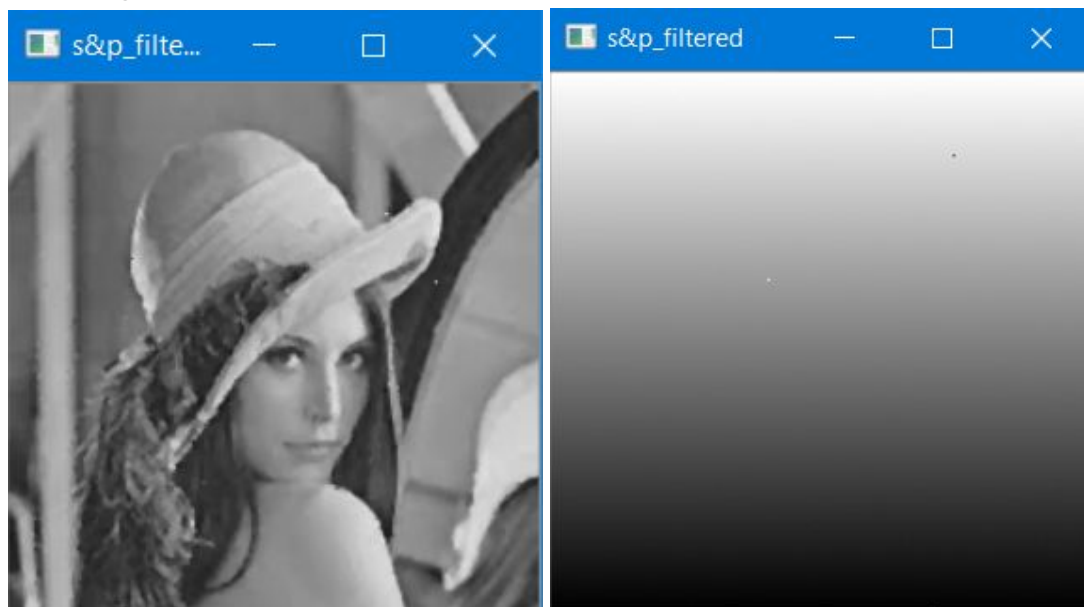
Perform filtering of salt and pepper noise and sharpening

Adding noise Noise amount 0.1

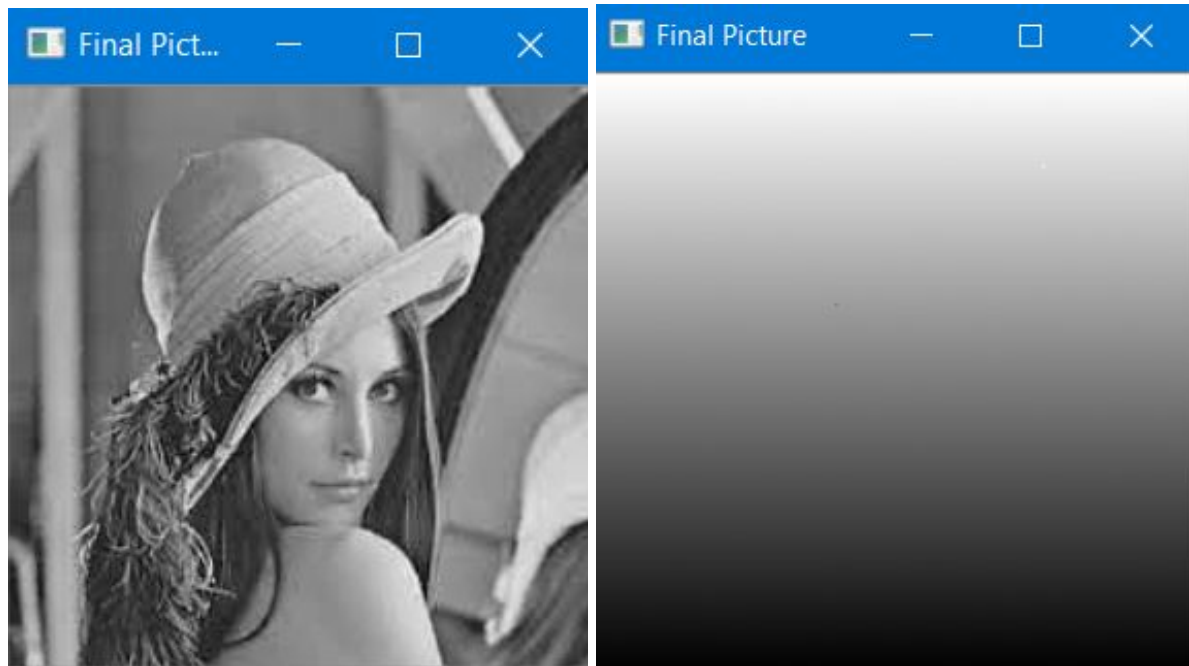




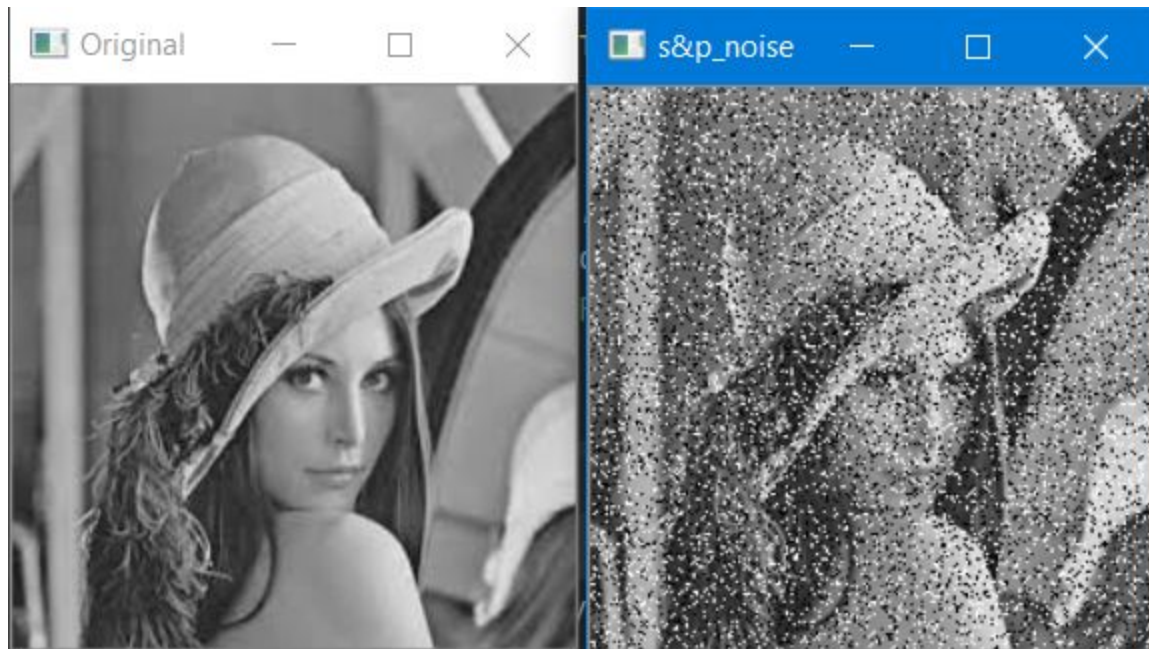
Filtering

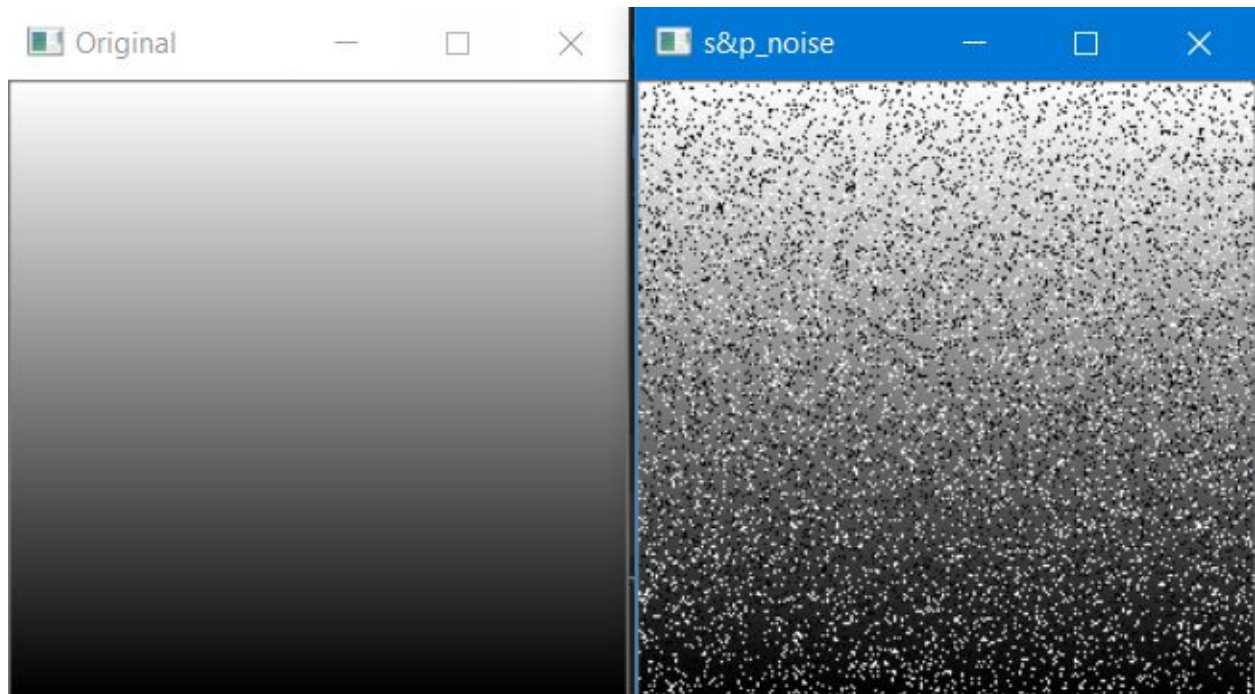


Sharpening

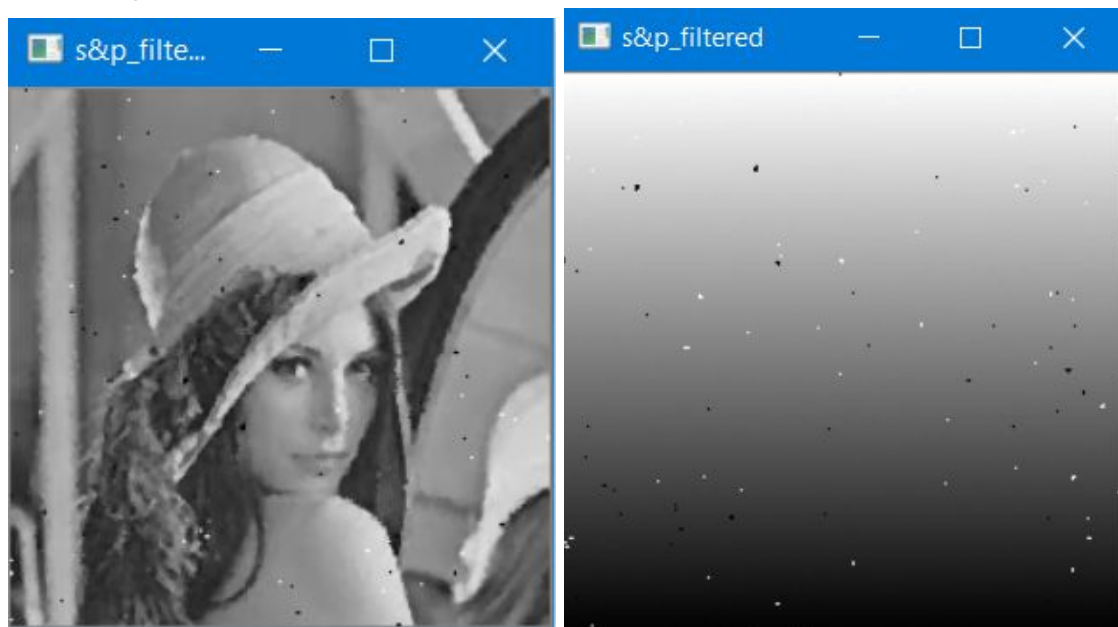


Adding noise Noise amount 0.2

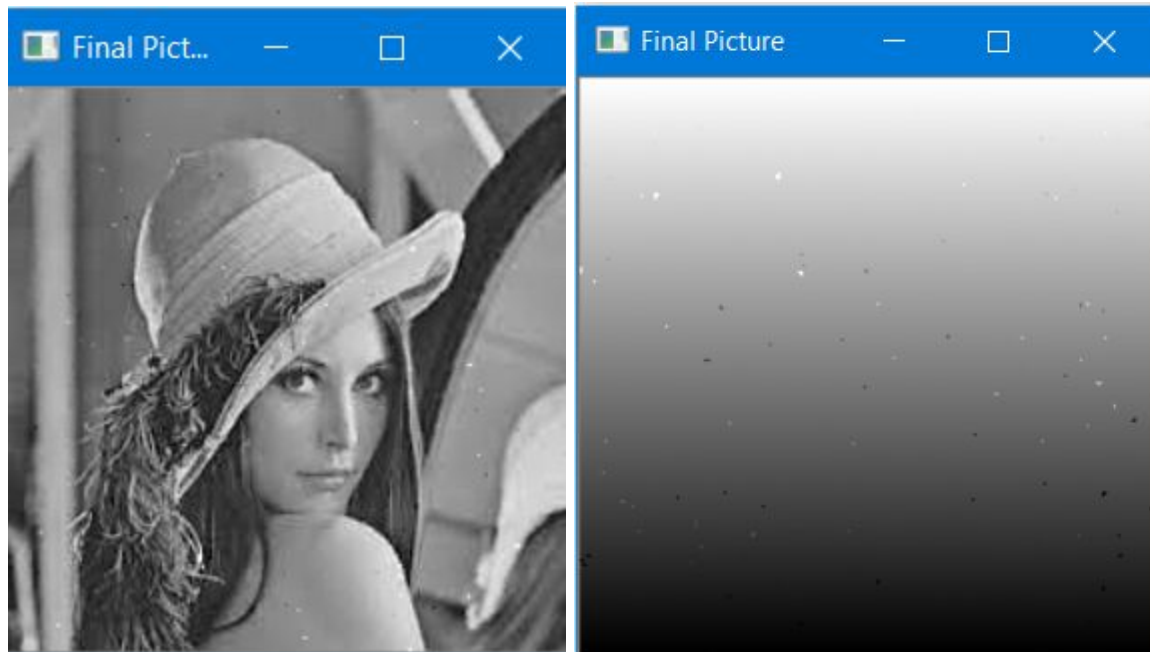




Filtering



Sharpening

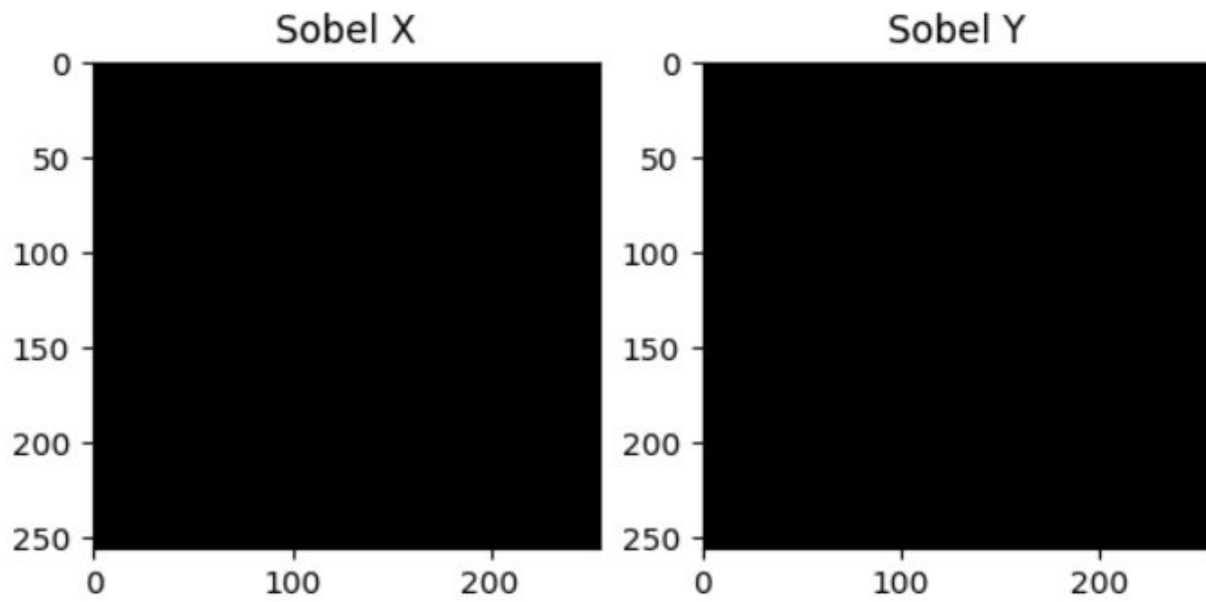


One can observe that the value of standard deviation affects the noise added. Standard deviation increases the gaussian noise also increases and the same for salt & pepper noise when we increase it. When we perform the filtering it actually blurries the image so we do the sharpening of the image. The sharpened image is generally the same as the original but still has some noises. For low frequency images the result image is better because it contains less noise. And for high frequency images There is quite big difference. With salt & pepper noise we can clearly see in both high and low frequency images that some pixels still have black and white color. However the resulting images are not 100% same. That implies that our filter will remove 90% of noises but removing gaussian noise is quite a hard task as the quality of picture is affected.

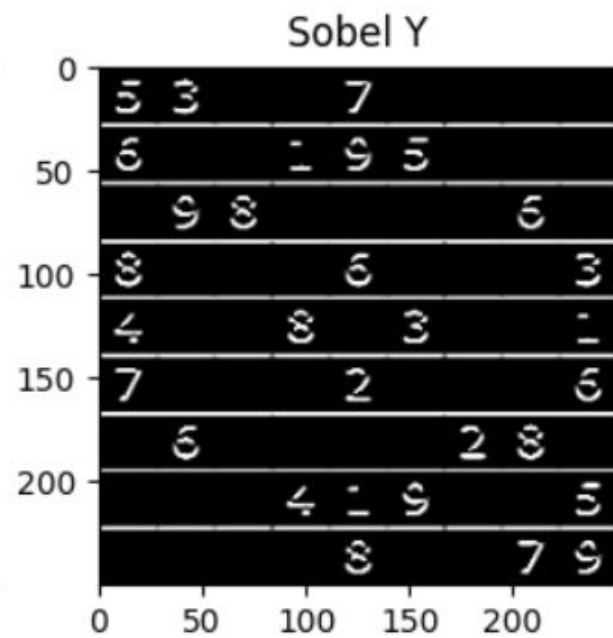
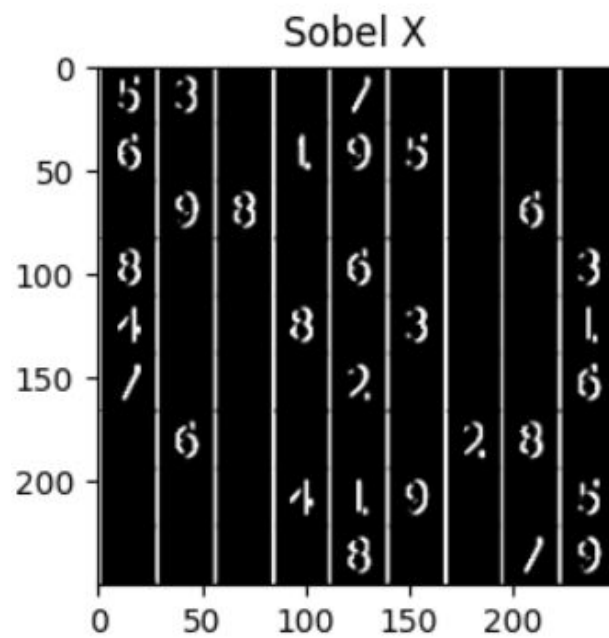
Task 3:

Perform edge detection using a Sobel filters

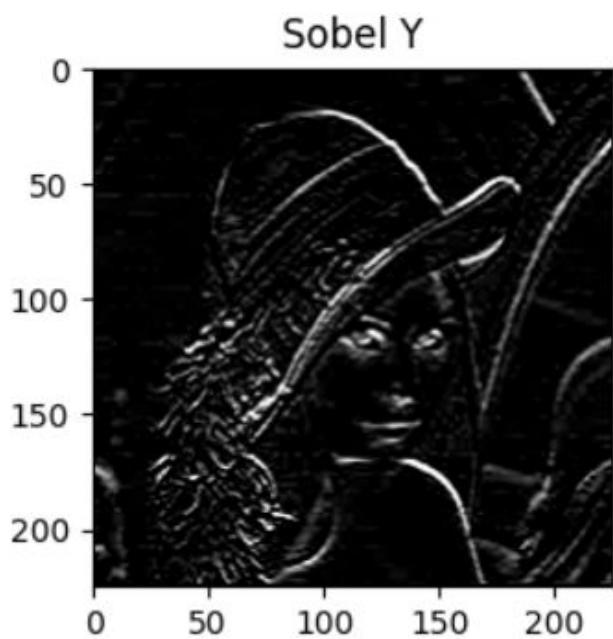
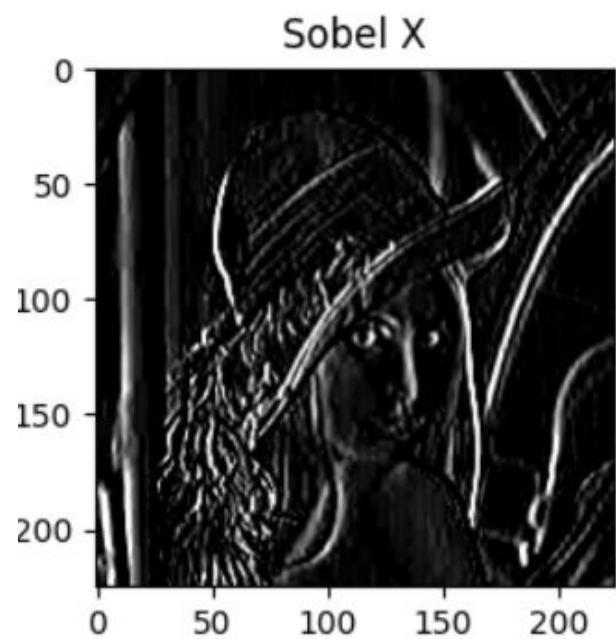
Gradient



Sudoku for understanding



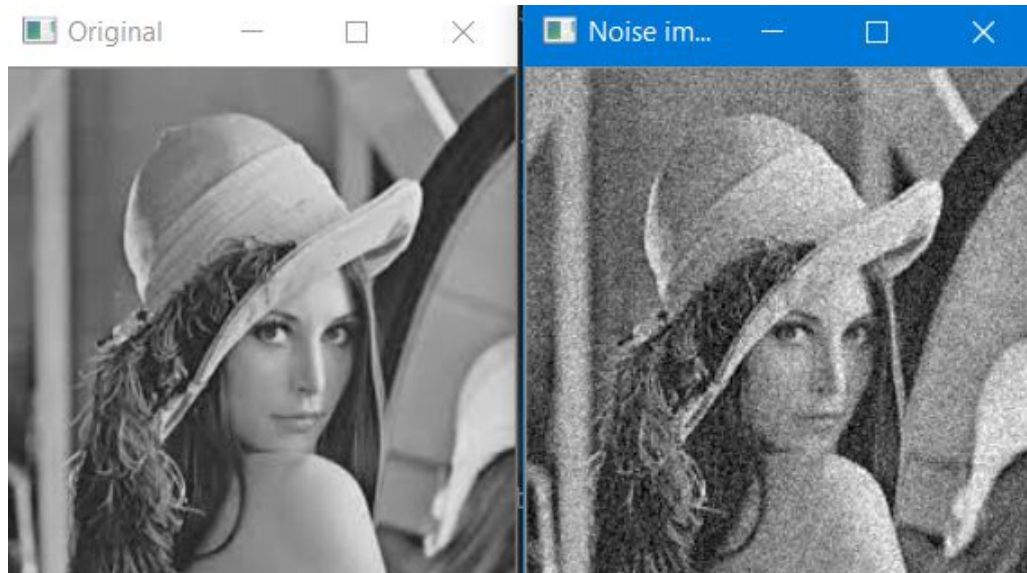
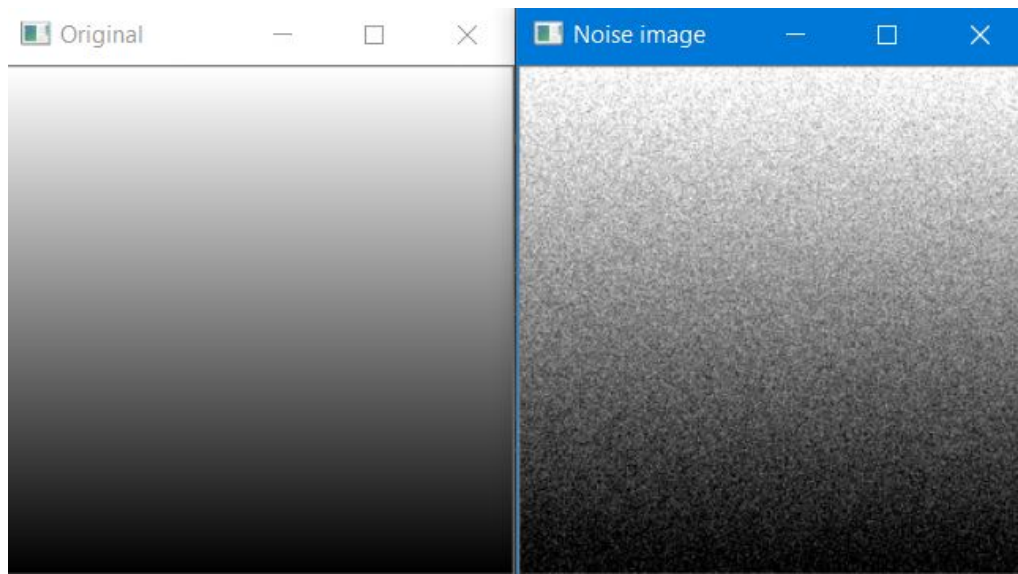
Lena

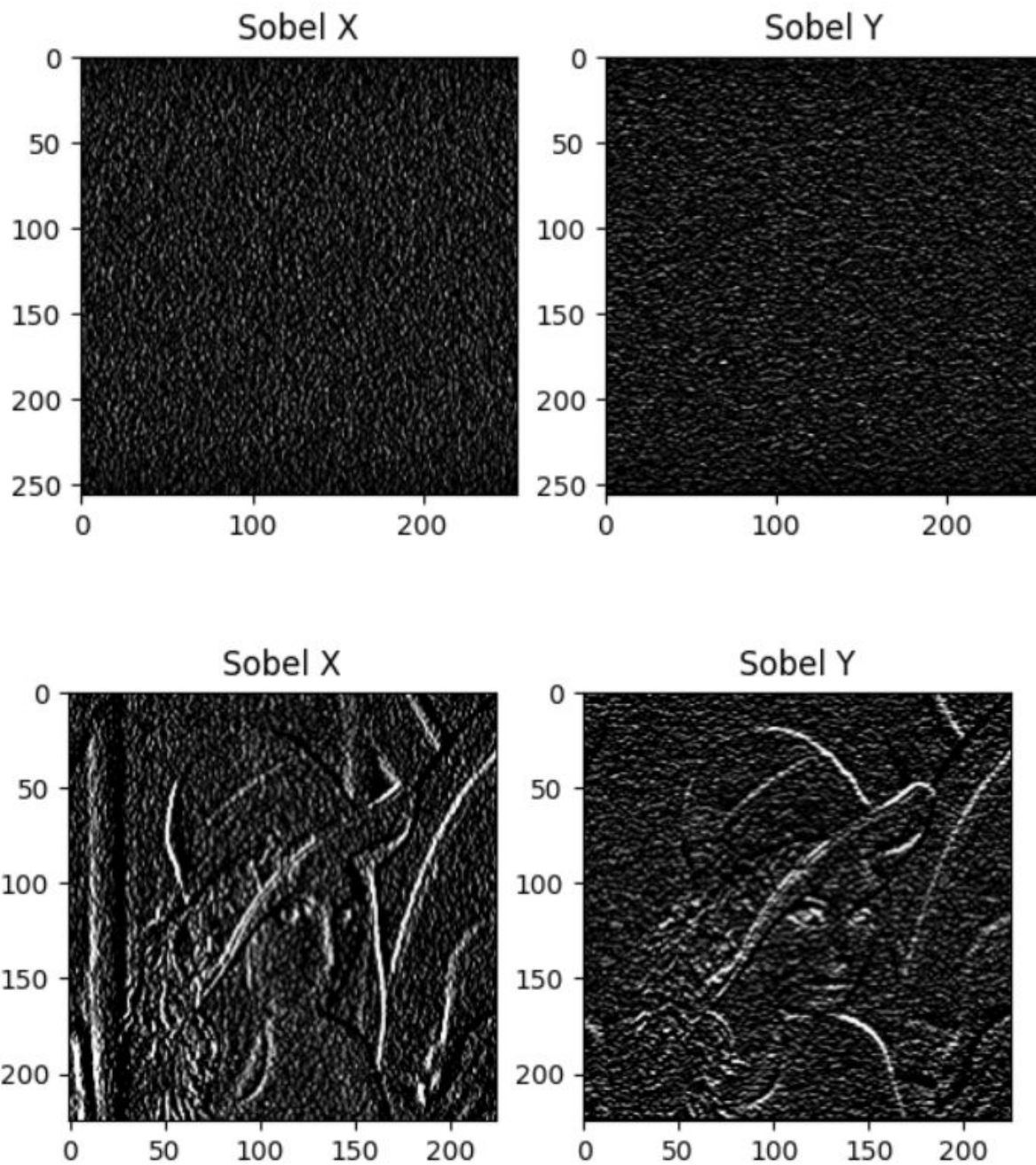


Task 4:

Perform edge detection using a Sobel filters for images with Gaussian noise

Adding gaussian noise with standard deviation 0.08

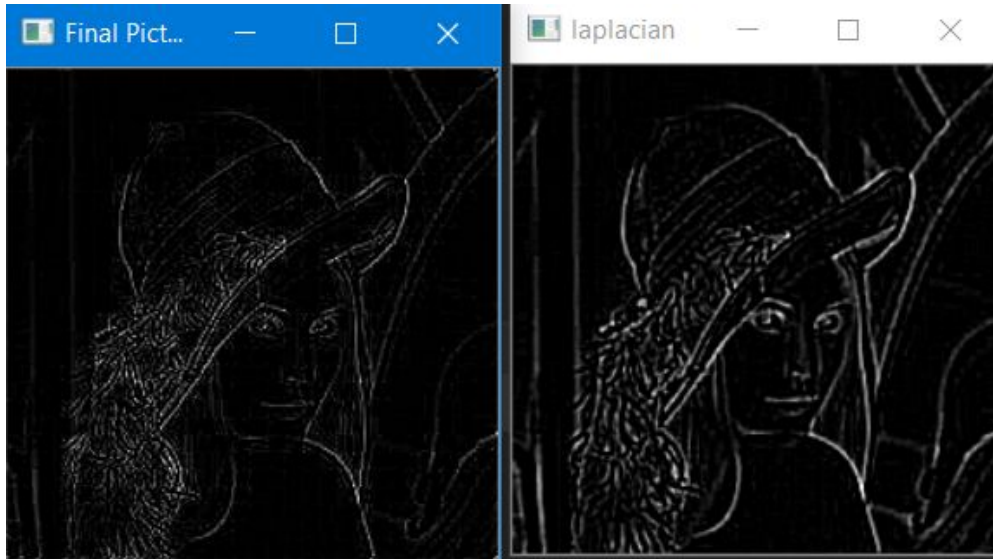




We see that gaussian noise is also detected as edges and that too in x and y direction only. The rest of the image remains the same as in above.

Task 5:

Perform edge detection using a custom written Laplace filter.



As we see both the images above are similar.

Right one is filtered by a custom kernel and the left one is filtered with a built-in Laplacian filter.

