Q2.

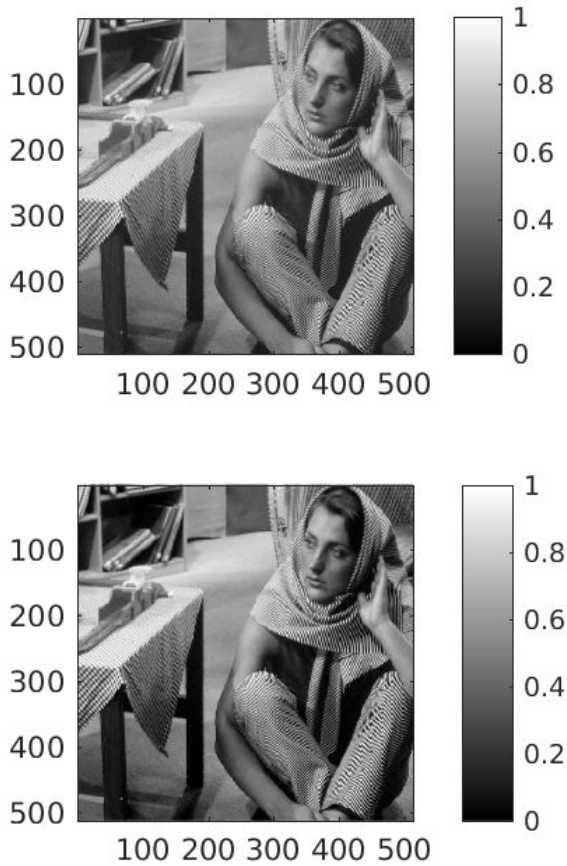
a) Linear Contrast Stretching

Formula

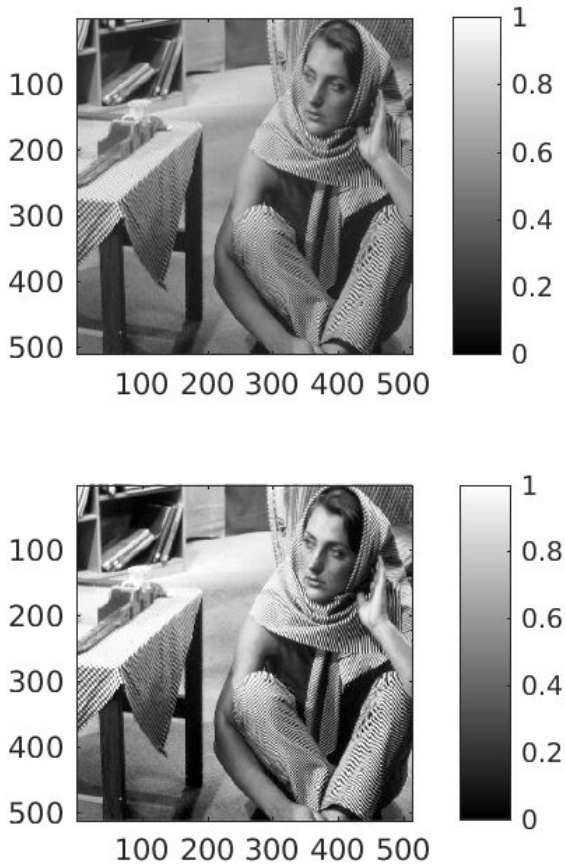
New Intensity = (Old Intensity - Minimum Intensity)/(Maximum Intensity - Minimum Intensity).

If Max Intensity = Min Intensity => Image is constant. In that case, New Intensity = Old Intensity.

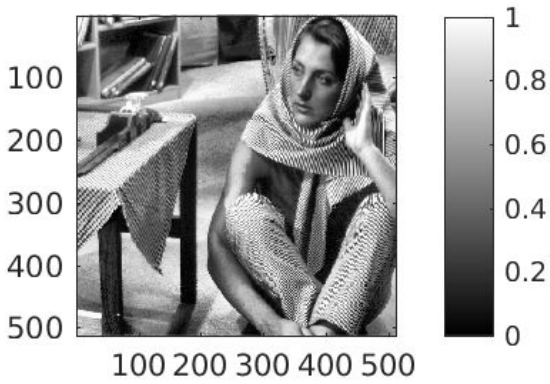
Barbara :



Barbara Linear Contrast Enhancement.

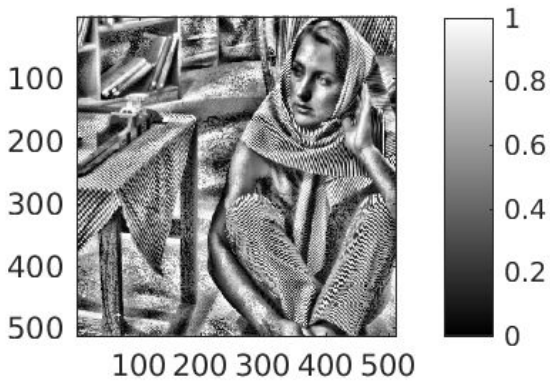


Barbara Histogram Equalisation

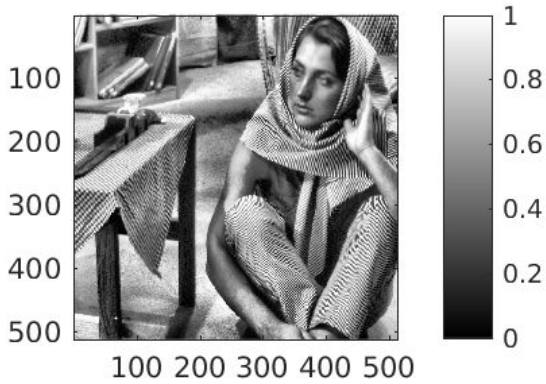


Barbara AHE
Window Size 201

Barbara AHE
Window size 401
Image is not as enhanced at the one with window size 201

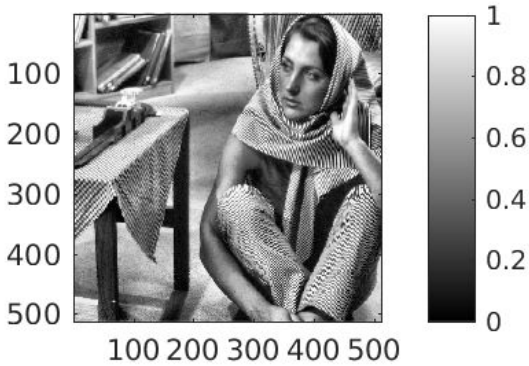


Barbara AHE
Window Size 51
Clearly Noise amplification can be observed.



Barbara CLAHE
Window Size 121
Threshold 0.001

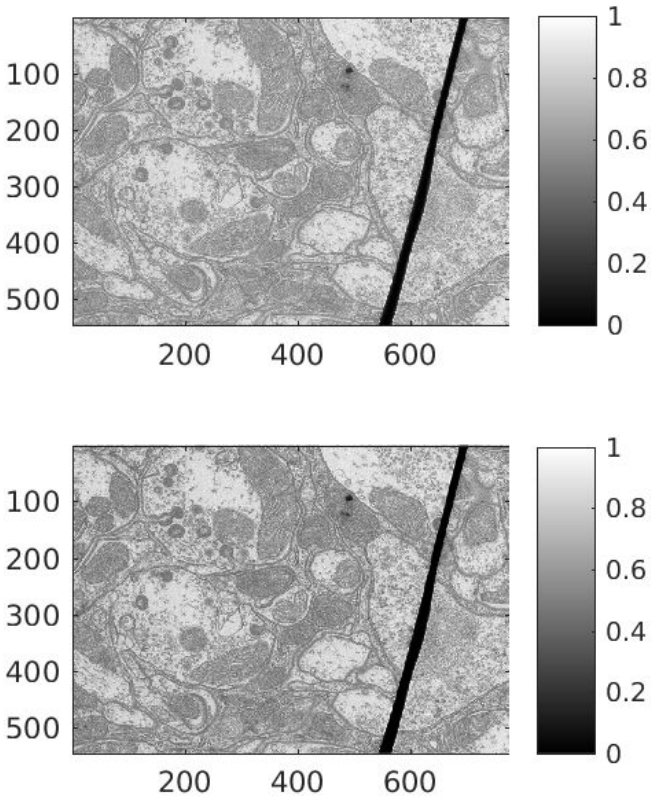
We can see that this gives better contrast enhancement than AHE since we were able to use a smaller window significant increase in noise.



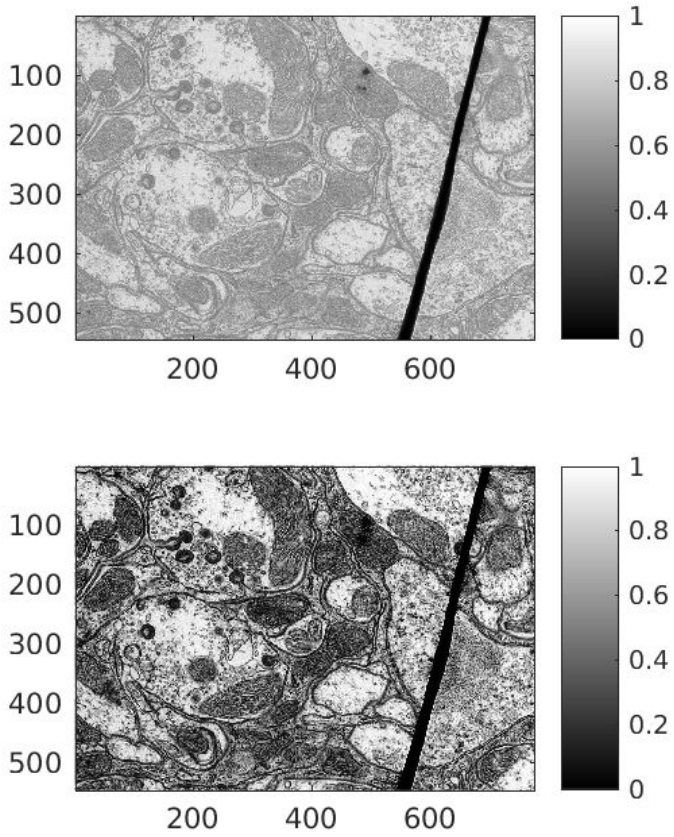
Barbara CLAHE
Window Size 121
Threshold 0.0005

On reducing the threshold by half, contrast decreased significantly.

TEM :



TEM Linear Contrast Stretching



TEM Histogram Equalisation