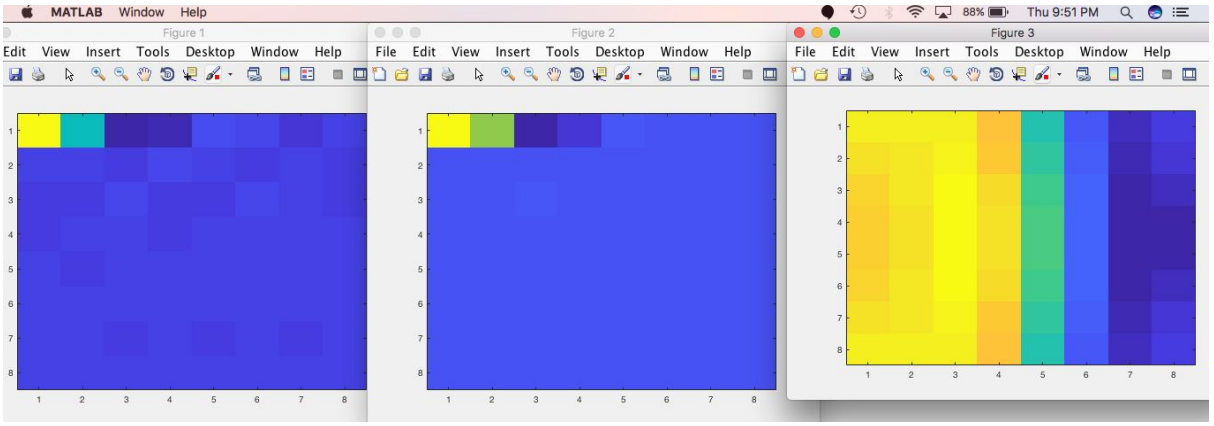
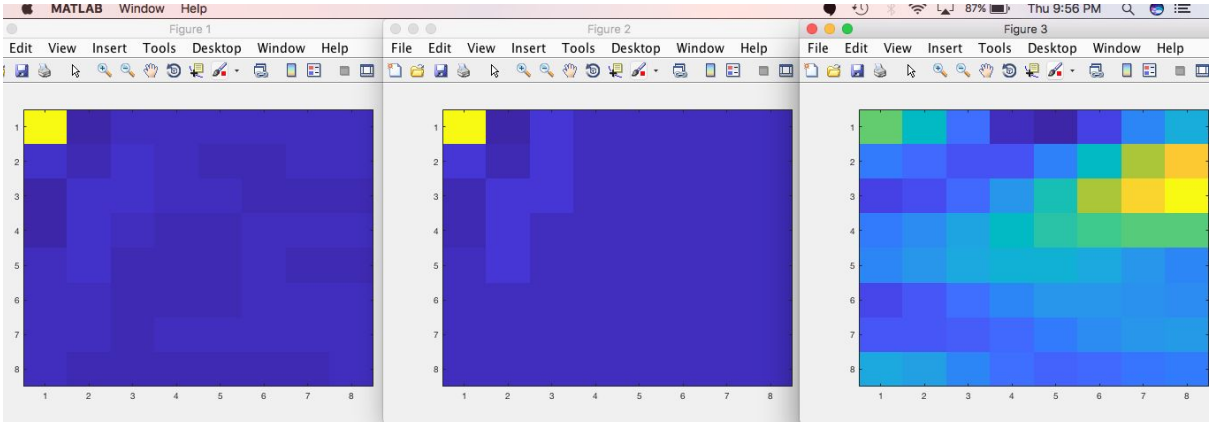
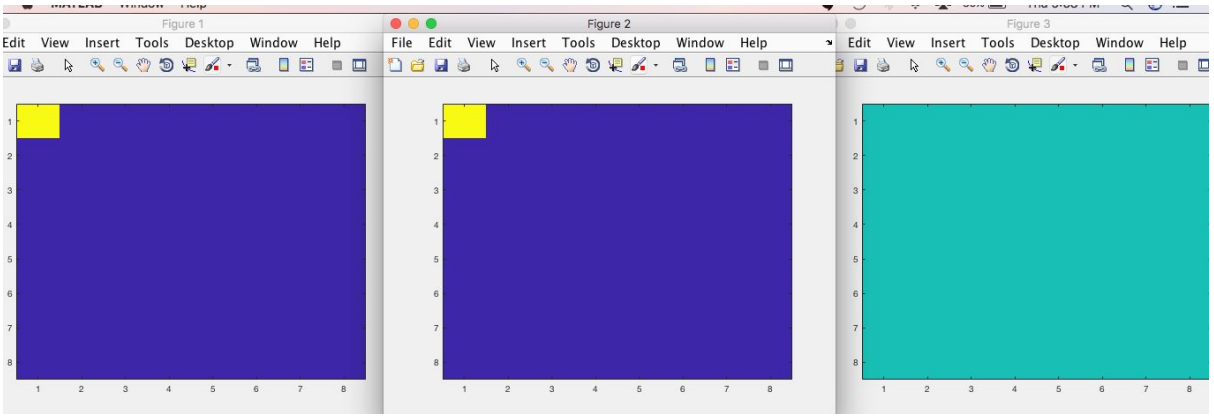
Q1)2)



Left to right:
After dct, quantisation and reconstruction respectively of the first sub matrix.



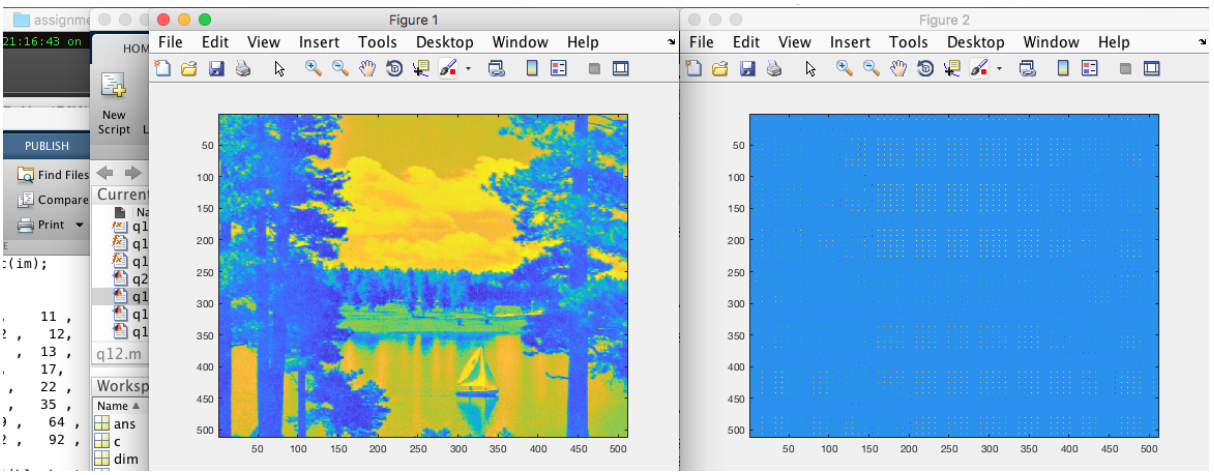
Left to right:
After dct, quantisation and reconstruction respectively of the second sub matrix.



Left to right:
After dct, quantisation and reconstruction respectively of the third sub matrix.

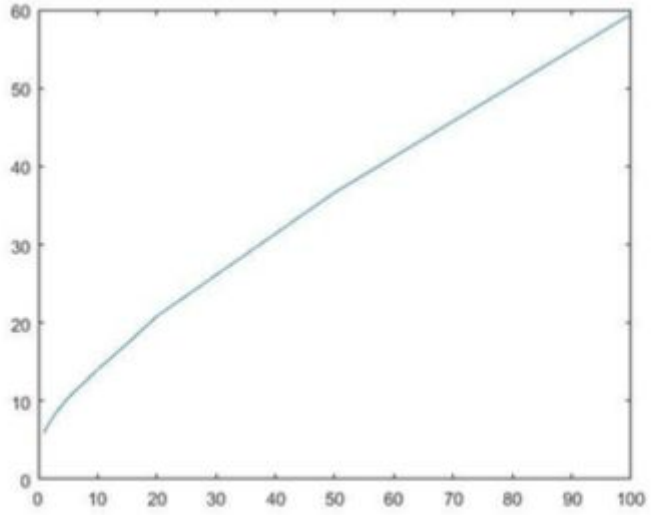
Observe how, in the reconstructed image, there are series of blocks with a constant colour. This implies we would achieve significant compression by run length encoding. Brighter regions have lesser data loss than dark regions.

3)

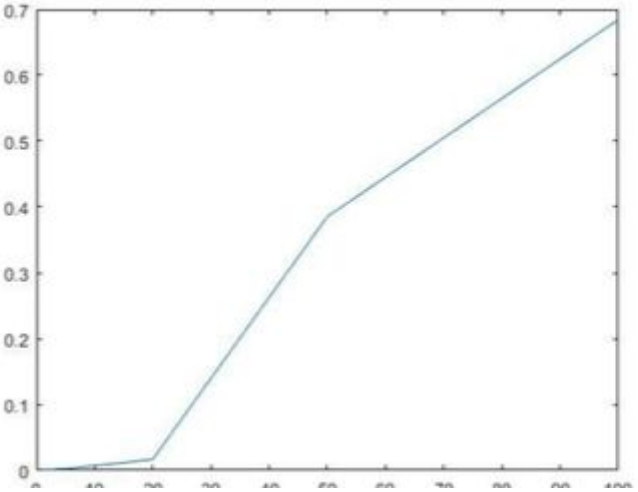


Left to right:original image, transformed image
the general shape of the image is visible in the transformed part while the brighter parts are even brighter.

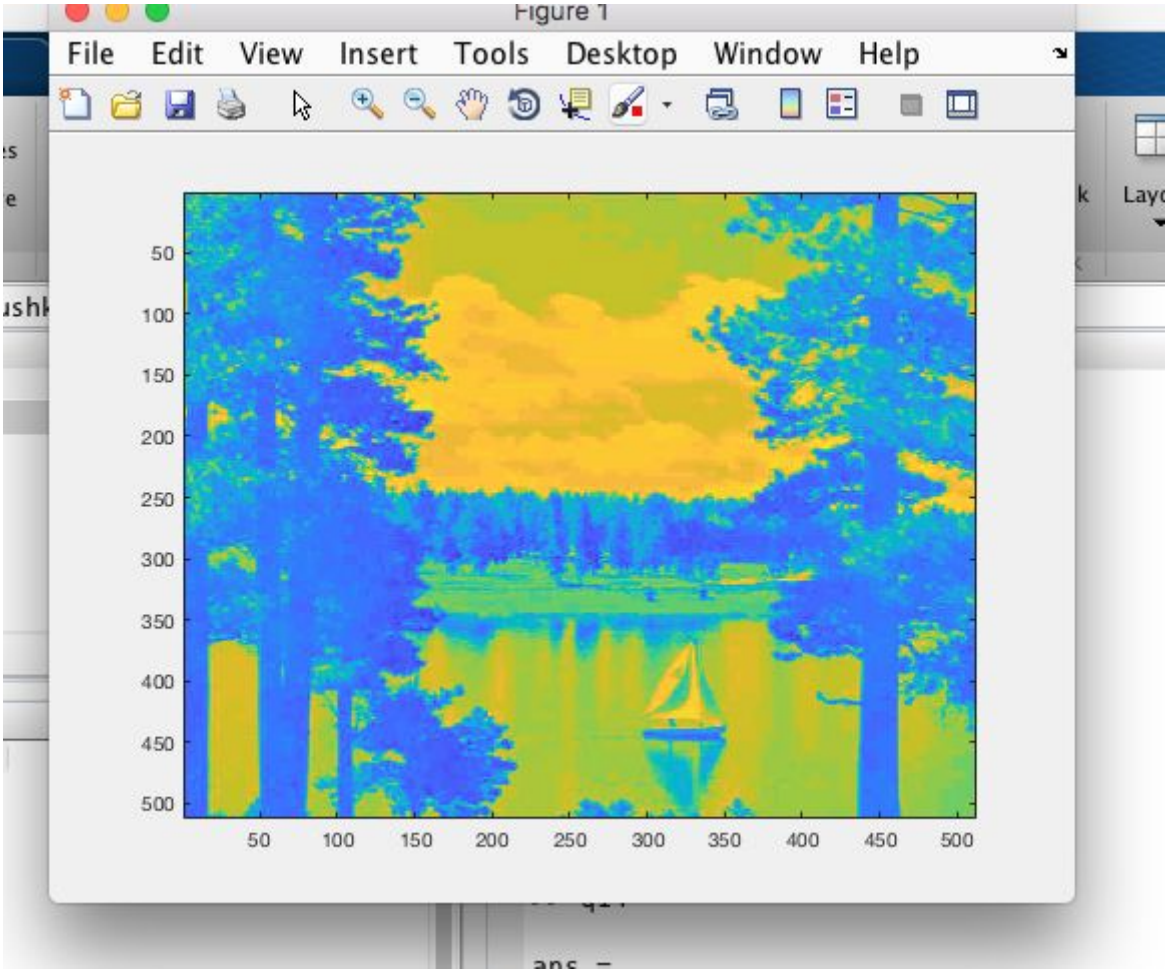
4)
c = 1: RMSE = 6.0175, entropy = 7.9846e-04
c = 5: RMSE = 10.3763, entropy = 0.0035
c = 10: RMSE = 14.0217, entropy = 0.0103
c = 15: RMSE = 17.3306, entropy = 0.0165
c = 50: RMSE = 36.6655, entropy = 0.5562
RMSE and entropy both increase with c as seen by graph(because more values would be round to 0 during quantisation which would remain 0 after de-quantisation as well) .
Plots of RMSE and entropy with c:-



C vs RMSE



Reconstructed image for c=3 when differences are just perceptible



The below image (c=10)shows blockiness and pixelation. The RMSE is 14.0217 and the entropy is 0.0103. Since c is large, more data is lost as more values become 0 during quantization (because of rounding)which remain 0 after de-quantisation also.

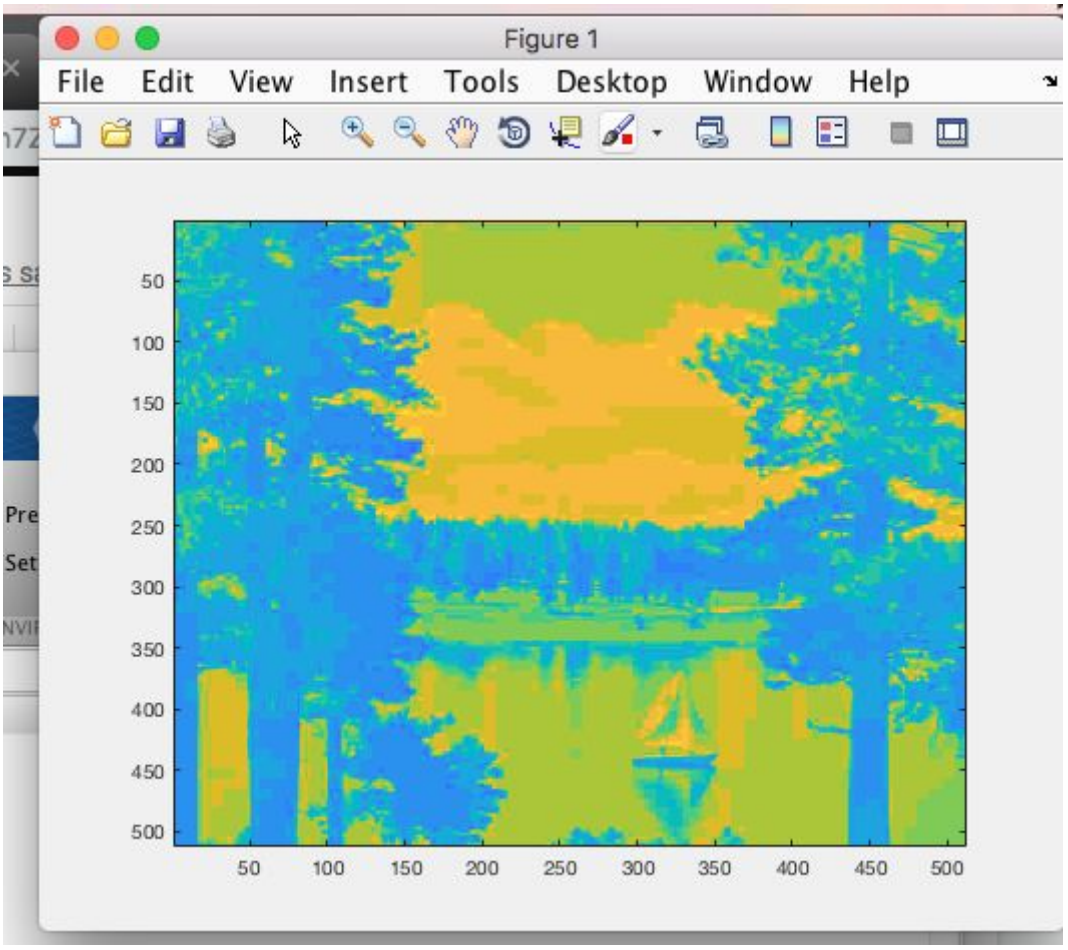


Figure 1
File Edit View Insert Tools Desktop Window Help
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50 100 150 200 250 300 350 400 450 500