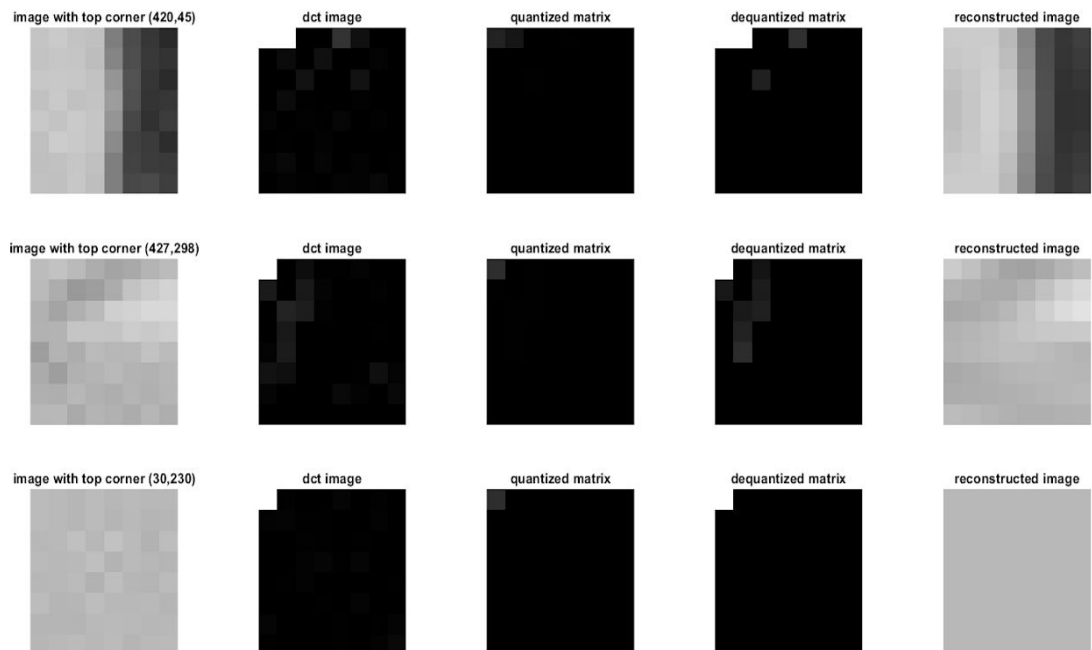


# Question 1.

1.

- For finding dct matrix i used formulae given in the question and verified with the matrix coming by using `dctmtx` function.
- For finding dct i used the formulae  $F \cdot \text{IMAGE} \cdot F^T$
- For finding inverse dct i used  $F^T \cdot \text{IMAGE} \cdot F$
- Divide the `compression_factor`\*quantisation matrix from the image
- Multiply the `compression_factor`\*quantisation matrix from the image
- Find the difference of the two images, take squares of all values, now sum and then square root will be the RMSE
- First use `imhist` function to find array of values now use the formulae  $p \cdot \log_2(p)$  for each  $p$  in matrix where  $p > 0$ . Then entropy will be the sum of all values.

2.



- a. In the first image column high frequency changes in the vertical direction are removed and low frequency changes remain intact in the reconstructed image.
- b. In the second image there is a pattern in diagonal direction so it will get levelled up.
- c. This is a random image so so it will only have one ac term in the top left corner.

3.



For each small matrix of  $8 \times 8$  we find dct image and combined as a corresponding position then we get the first image, which shows that for each block there is a dot in the top left corner of the block. Now i quantized the image which is shown in the second image of the above figure, this means the loss of information which has lesser value than the quantization matrix.

4.

For Compression factor= 2

**original image**



**reconstructed image**



RMSE ->> 7.416629

ENTROPY ->> 7.368143

For Compression factor =4

**original image**



**reconstructed image**



RMSE ->> 9.469249

ENTROPY->> 6.966538

For Compression factor= 6

**original image**



**reconstructed image**



RMSE ->> 11.170695

ENTROPY ->> 6.565068

For Compression factor - 8

**original image**



**reconstructed image**



RMSE ->> 12.709447

ENTROPY ->> 6.225344

For compression factor= 10

original image



reconstructed image



RMSE ->> 14.001880

ENTROPY ->> 5.867051

For value greater than 4, the distortion in the image can be seen. By increasing the value of Compression factor, the distortion increases as rmse increases and the entropy of image decreases. For  $c=10$ , the rmse becomes to high.