ASSIGNMENT 3 REPORT

QUES1

1. Price=2.5085e+5
2. No. Normalizing does not have any additional effects.
   Error with and without normalizing = 4.0753e+4
3. Theoretically mean should pass through the line and we get a value approximately close to one.
4. No this method is not applicable for large values of N as the it involves heavy matrix calculations which makes the complexity approximately O(N^3). This is unsuitable for large N. Inverse operation is performed with complexity O(N^(log7 base 2)).

QUES2

1. We can verify that both operations give different results by seeing the images.
2. Error = 7.3451e+16
3. Error = 4.5012e-15
   Error is reduced after zero padding.which may be linked to convolution theorem validity for discrete signals on circular convolution.

QUES3

Since number of points increase, we get a better resolution of the fft.

QUES4

- First I found out the number of cycles(size/f).
- By looking the plot in fourier domain, find the peaks(4).
- Zero all other values except for the peaks to denoise.
- Find the x coordinate of peaks and divide by no of cycles to get the frequency.
- Consider only first half frequencies as other represent conjugate.

QUES5

- Time overlap assumed to be 4s.
- Take start and end samples of given packets.
- Do correlation to find 1st packet.
- Find other packets using end part of previous packet.
- Order->[3 5 1 2 4].
- For denoising select few samples in fourier domain and zero out others.

QUES6

1. Moving average filter is used for low pass filter as when we take the average high peaks become low and thus only low peaks can pass.
2. To optimise the previous filter, we take two convolutions:
   a. Row wise
   b. Column wise

Improvement in complexity as we make use of previously calculated values. Complexity decreases from O(K^4) to O(K^3).

QUES7

- I have used two normalising functions:
  - X-min/max-min
  - X-mean/std(X)

- Error from both of them are:
  - E = 1.3665e+04
  - B = 1.0e+03*[3.2064, 0.0445, 0.1427]
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  - E = 3.3392e+03
  - B = 1.0e+03*[3.1216, 0.0106, 0.0365]

- Error in second case is lesser.