<u>MATLAB Programming Assignment 1</u>

Submission Deadline: February 10 2020, 11:59 PM

Instructions:

- **i)** **Submit on Blackboard before deadline.**
- **ii)** **No collaboration is allowed for any problems.**
- **iii)** **Make sure you turn in your codes as well as all other problem specific requirements such as figures, results, explanations, and screenshots.**
- **iv)** **Make suitable comments in the code to explain your code.**
- **v)** **Your figures must be appropriately labelled.**
- **vi)** **You'll lose points if you don't follow these requirements.**

1.

a) A continuous time signal is defined as

$$x(t) = 3\sin(600\pi t) + 4\cos(4000\pi t)$$

Plot this signal in a well labelled diagram. **(10 points)**

b) Sample this signal at sampling frequency **(10 points)**

- $f_s = 100\ Hz$

Using stem function, plot the samples for each case in a well labelled diagram.

c) Use MATLAB's fft function to compute the 1024-point fft of both original and sampled signals above and plot the absolute value. **(2X5= 10 points)**

d) Simulate passing the signal through a low pass filter by making the upper 512 points of the computed fft equal to zero. Plot the absolute value of this new filtered signal.

(15 points)

e) Use MATLAB's ifft function to compute the 1024-point ifft of the filtered signal. This is your recovered signal from the samples after passing through a low pass filter. Plot the absolute value of this computed signal.

(15 points)

2. Re-do Problem 1 by changing sampling frequency to $f_s = 1000\ Hz$. **(10 points)**

3. Re-do Problem 1 by changing sampling frequency to $f_s = 10000\ Hz$. **(10 points)**

4. Compare the recovered signals in Problems 1, 2 and 3. Explain why the figures are different. Submit this answer in a separate text file. **(20 points)**

Note: You have to submit three sets (one for each f_s) of 6 figures (18 total), three sets of codes (one for each f_s) and a text file for Problem 4 for this assignment. You can use subplot function to reduce number of image files.