DFT Implementation Project

Due: 11/2/2020

Summary: This project will require you to implement the DFT computation for a given signal in a MATLAB script and compare your output to the output of the MATLAB fft() function.

Project Steps

1. The input signal $x[n]$ is contained in a text file: signal.txt. The data format is "%1.4f\n" and there are 1028 samples. Write the code to read these 1028 values into a floating-point array. Plot the signal $x[n]$.

2. Write code to calculate the 1028-point DFT of the signal of $x[n]$:

$$X_1(k) = \sum_{n=0}^{N-1} x[n] e^{j\frac{2\pi}{N}nk}$$

3. Plot the magnitude and phase of $X_1(k)$.

4. Use the MATLAB fft() function to calculate $X_2(k)$, the 1028-point DFT of $x[n]$. Plot the magnitude and phase of $X_2(k)$.

5. Compare the magnitude and phase plots for $X_1(k)$ and $X_2(k)$. They should be the same if you implemented the DFT correctly in step 2.

6. Submit your MATLAB script that accomplishes steps 1-5 above, as well as any plots generated. Combine these into a zip file and upload into Canvas.