Design a GUI for the digital filter as follows:

Numerator Coefficients

Frequency response

Denominator coefficients

Decibel plot

√

Input-Output view

Sampling freq (Hz)

Enter

Mode 1 -Filter’s phase response in this space.

Mode 2 – Frequency domain of the output (Mag vs. Freq. in Hz)

Mode 1 -Filter’s magnitude response in this space

Mode 2 – Frequency domain of the input (Mag vs. Freq. in Hz)

Max = Fs/2

Min =0

1. Provide the space for the user to enter array of numerator and denominator coefficients. User can enter coefficients in the square brackets provided in the space, for ex. [0.2452 0 -0.2452].
2. Provide the space for the user to enter the sampling frequency. User should click the push button ‘Enter’ after entering the values. After clicking enter – Max limit value of slider is set to Fs/2 Hz. Min limit value remains 0 Hz.
3. User can click on the option to view the filter’s frequency response (called as Mode 1 here). Once it is selected, GUI should display the magnitude and phase plot of the filter. Magnitude plot can be either linear plot or dB plot according to selection. A check box is to select a decibel plot of magnitude response. (Default view is linear plot). On x-axis it is frequency in Hz, i.e. from 0 to Fs/2. (It can be suitably assumed that the plots would be normalized in magnitude scale. For linear plot –Max value =1, for dB scale max value = 0. This can be taken care by the user while entering the coefficients.) Select a dB scale from 0 to -80 dB.
4. User can also select an input-output view (called as mode 2 here). In this mode, a slider is available to select a value between 0 Hz to Max Fs/2 Hz. According to the position of slider, a sinusoidal signal of 1 V and of selected frequency should be provided as the input to the filter. GUI should display input and output frequency domain view in the spaces provided. Frequency domain view should be neat, one sided spectrum from 0 to FS/2. (Here, FS-Sampling freq), plotted as magnitude vs. Freq in Hz.

All axis labels and titles of the plot are to be generated by the program accordingly.