

Assignment
CSE 4342
Function for Project Lab

1. Given 3 Seconds of a 100 Hz sine wave, (time between samples = $1/2000$ seconds, Figure 1) and a set of filter coefficients for a 90 Hz FIR filter, filter the 100 hertz signal with the 90 Hz filter. The Frequency Response of the filter is illustrated in Figure 2.
 - a. Write a C program to perform a multi-threaded program for digital filtering and use for filtering the 100 Hertz signal as illustrated in Figure 3.
 - b. Give the max and average amplitude (begin after the first 100 points) of the filtered sine wave and compare it with the frequency response of the 90 hertz filter shown in Figure 2.

Keep your filtering function as it will be used in the Project Lab.

Figure 1 – One cycle of a 100 Hz Signal sampled at 0.005 seconds

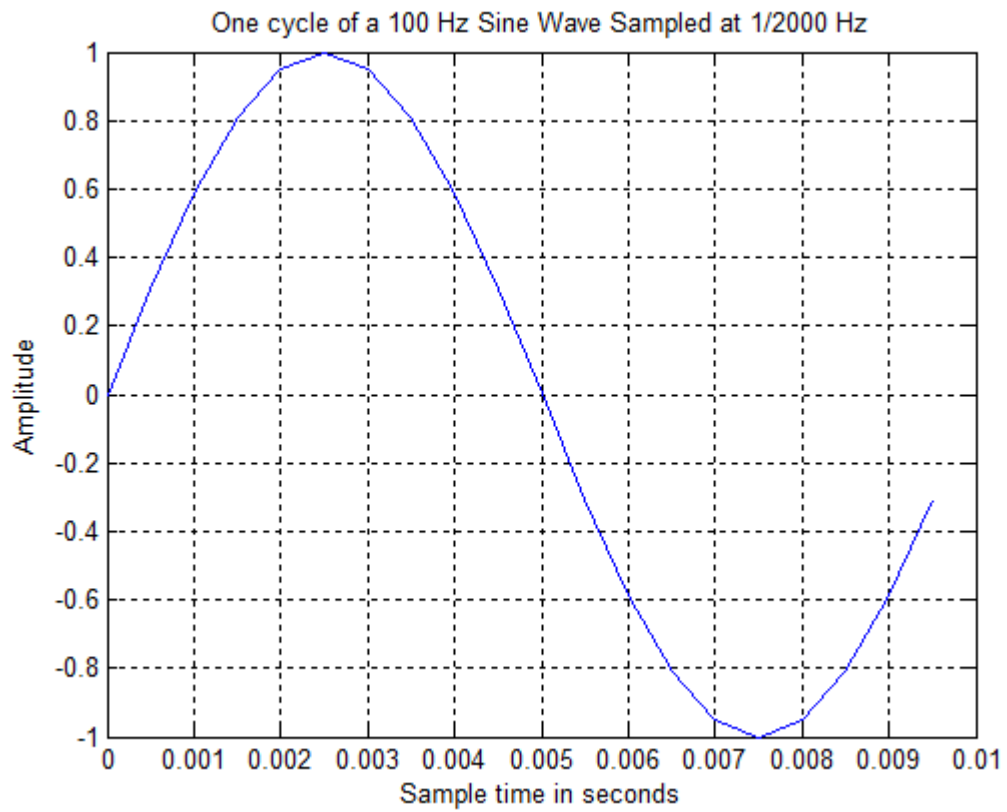
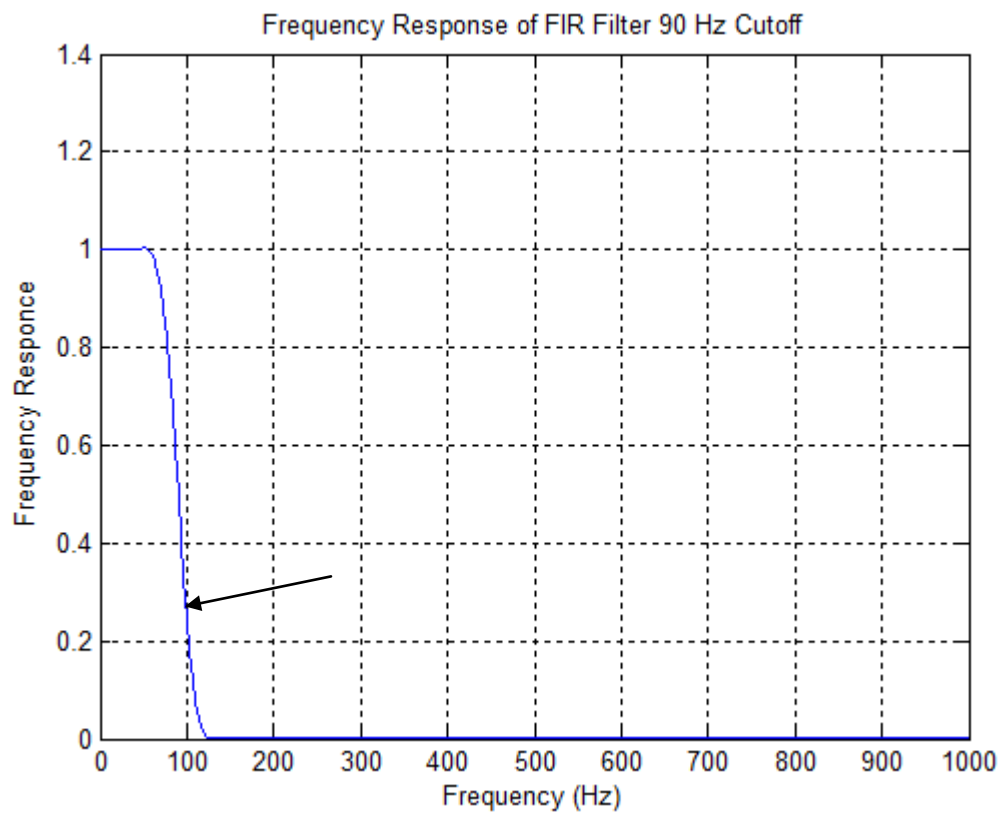
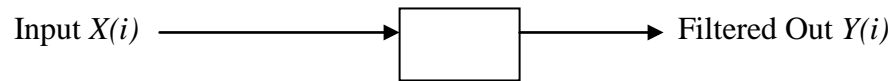


Figure 2 - FIR Filter, 101 Coefficients, Sampling Rate 2000 Hz.



The signal, X, can be filtered by the Filter b using the following method (see class slides):



$$Y(i) = \sum_{j=0,L} b(j) * X(i-j)$$

Example:

Filter Coefficients for Averaging Filter, $L=2$, (3 coefficients)

$$Y(k) = X(k)*b(0)+X(k-1)*b(1)+X(k-2)*b(2)$$

Figure 3 100 Hz signal filtered with a 90 Hz FIR filter

