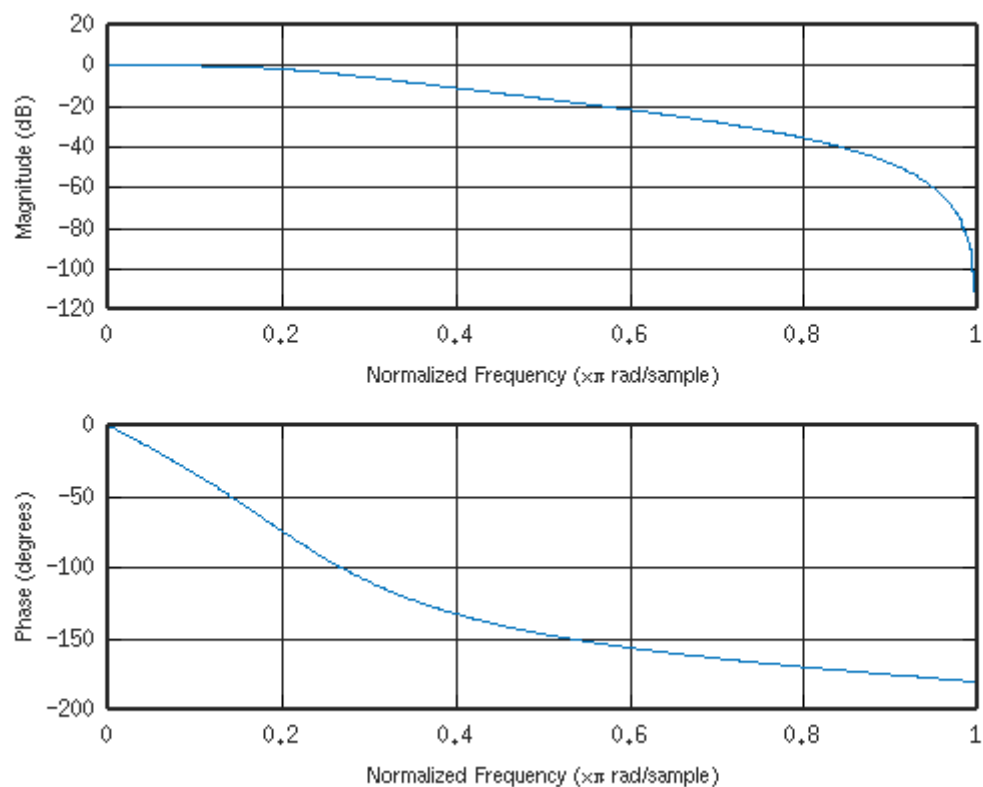


Goal: To determine the time domain response of the transfer function

The transfer function for a linear, time-invariant, digital filter can be expressed as a transfer function in the Z-domain; if it is causal, then it has the form:^[1]

$$H(z) = \frac{B(z)}{A(z)} = \frac{b_0 + b_1 z^{-1} + b_2 z^{-2} + \dots + b_N z^{-N}}{1 + a_1 z^{-1} + a_2 z^{-2} + \dots + a_M z^{-M}}$$

Octave filter



-0.167980, -265.000

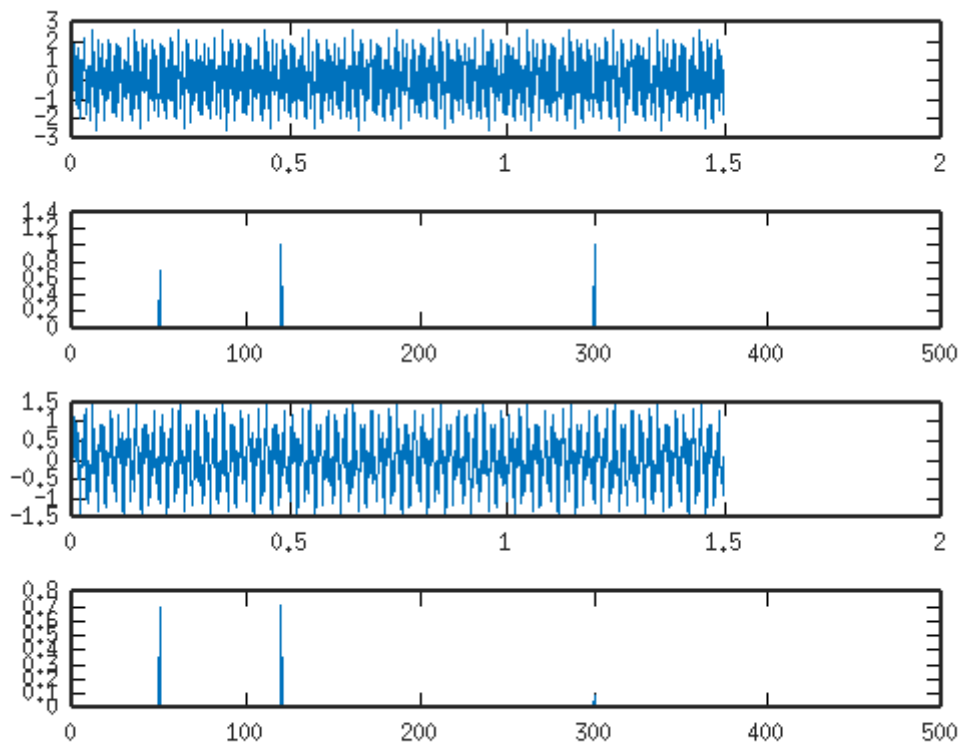
Testcase

The first signal x is 3 sine waves 50, 120, and 300 Hz

The 2nd is the FFT of the signal x .

The 3rd is the filtered with the Butterworth filter.

The 4th show that only the 50 & 120 Hz are present.



421.525, 4.77541

Starting first with order 2

a = 1.00000 -0.98241 0.34767

b = 0.091315 0.182630 0.091315

[A,B,C,D] = tf2ss(b,a);

A =

5.5511e-17 3.4767e-01
-1.0000e+00 9.8241e-01

B =

-0.059568
0.272338

C =

0 1

D = 0.091315