ECE 251 – FOE - ASU

Signals Processing Project Report

Spring 2019

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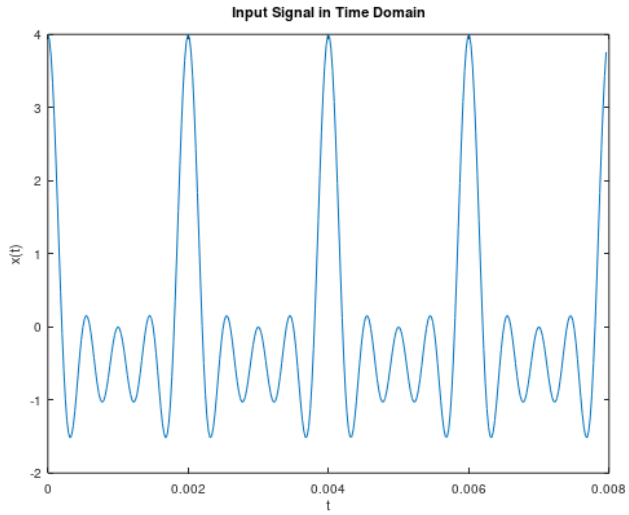
Steps:

$x(t)$:

$$Power\ in\ x(t) = \frac{1}{\mathrm{N}} \sum_{\mathrm{n=N}}^{2\mathrm{N}-1} |x[n]|^2 = 1.9724$$

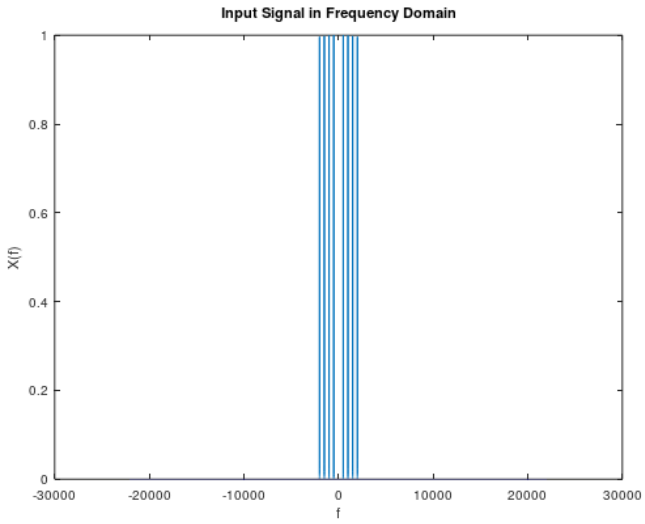


Note:

All time domain plots have 4 cycles only plotted on purpose to make the signal clearer.

$X(f)$:

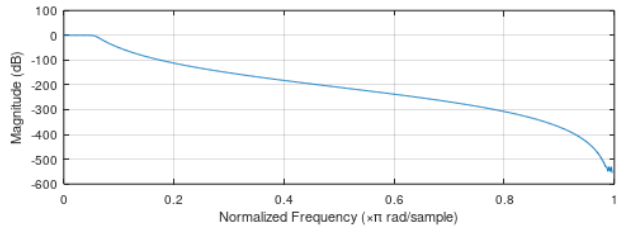
$$Power\ in\ X(f) = \sum_{\mathrm{k=0}}^{4} |a_k|^2 = 1.9939$$

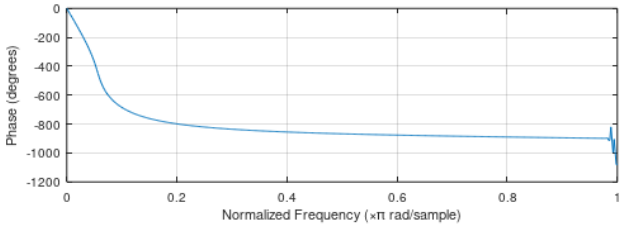


Note:

All frequency domain plots are plotted from $\frac{-f_s}{2}$ to $\frac{f_s}{2}$ as instructed.

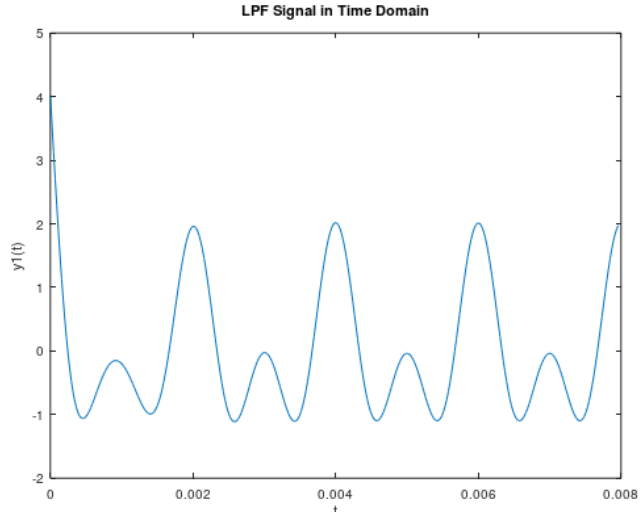
Butterworth LPF:





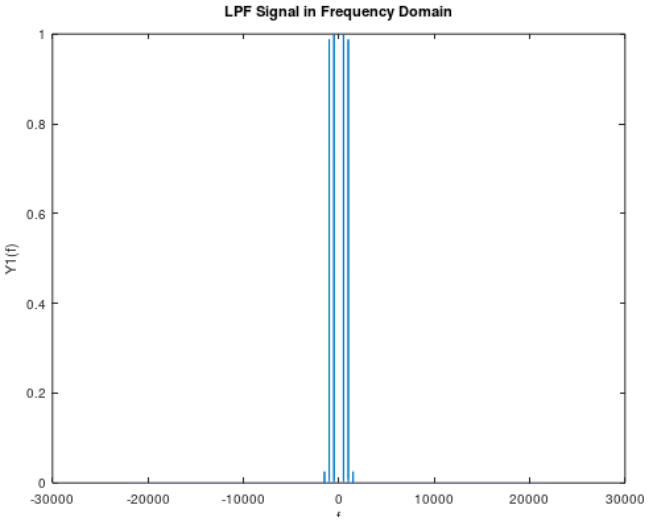
$y_1(t)$:

$$Power\ in\ y_1(t) = \frac{1}{\mathrm{N}} \sum_{\mathrm{n=N}}^{2\mathrm{N}-1} |y_1[n]|^2 = 0.98367$$

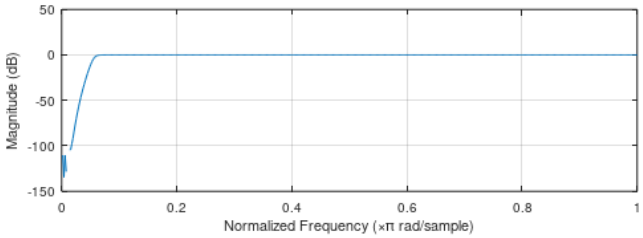


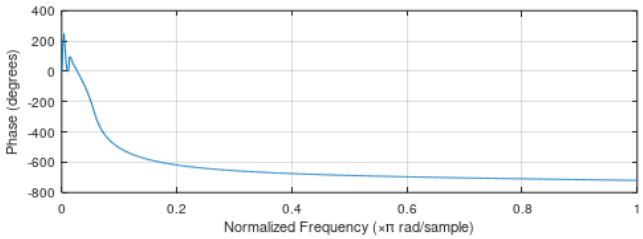
$Y_1(f)$:

$$Power\ in\ Y_1(f) = \sum_{\mathrm{k=0}}^{4} |a_k|^2 = 0.98766$$



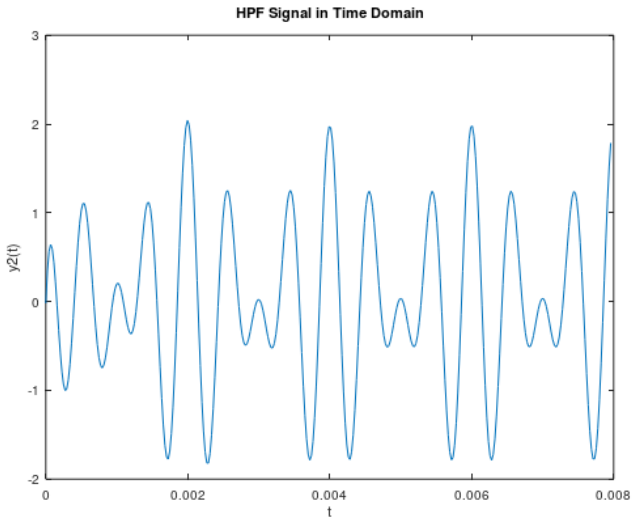
Butterworth HPF:





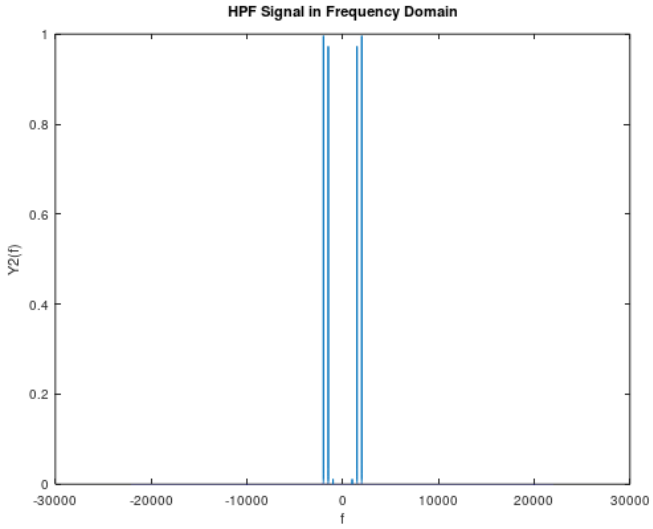
$y_2(t)$:

$$Power\ in\ y_2(t) = \frac{1}{\mathrm{N}} \sum_{\mathrm{n=N}}^{\mathrm{2N-1}} |y_2[n]|^2 = 0.99659$$



$Y_2(f)$:

$$Power\ in\ Y_2(f) = \sum_{\mathrm{k=0}}^{4} |a_k|^2 = 0.96932$$



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