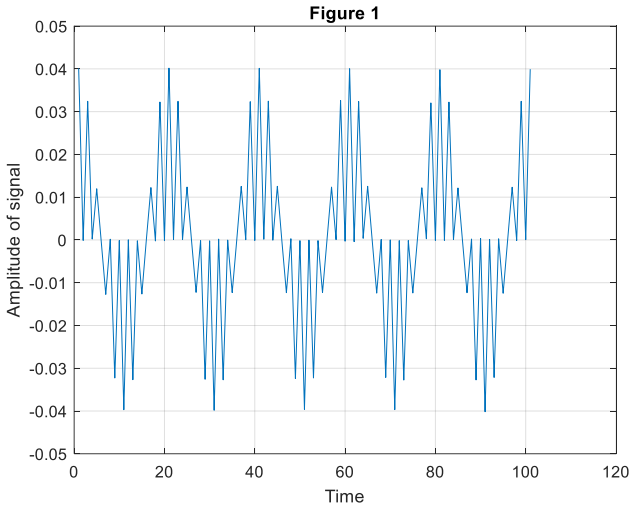
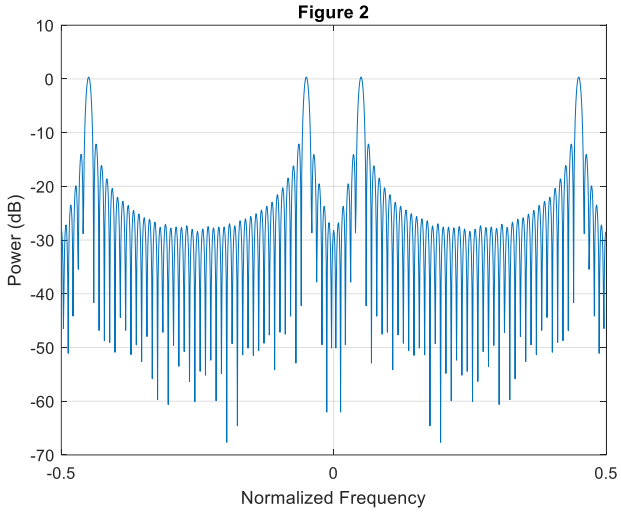
Richard Jacobsen 15.01.2024

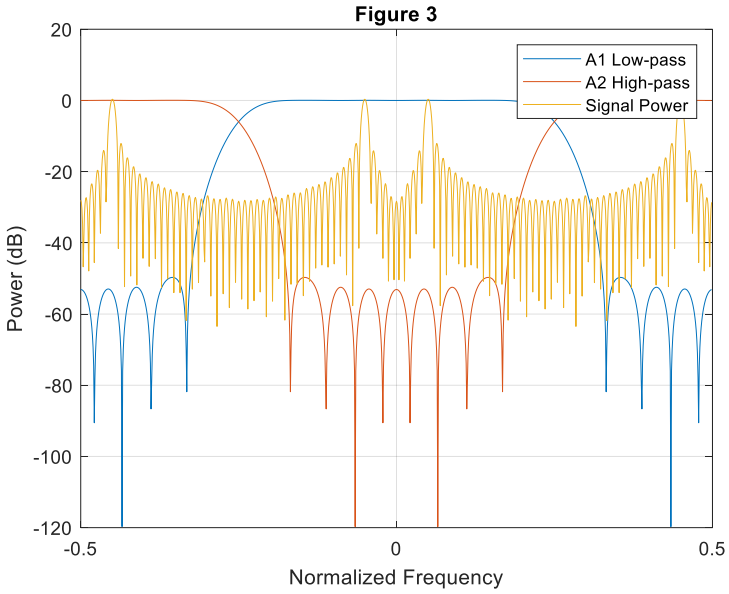
Problem 0:

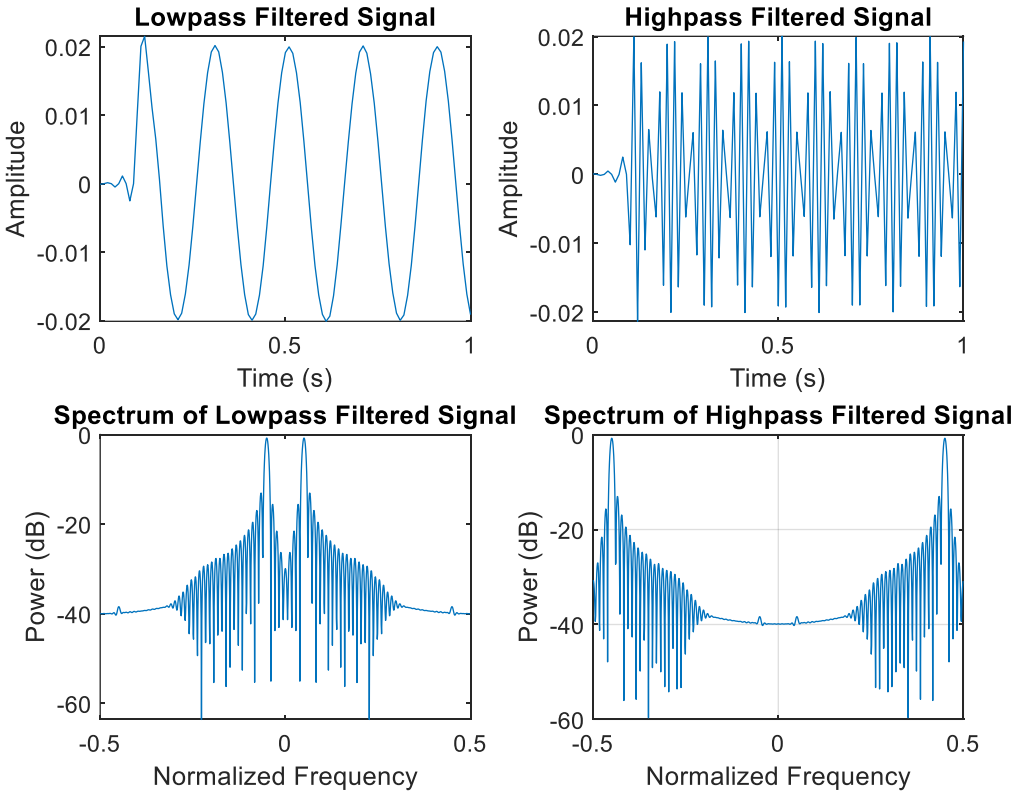
MTFYMA Biophysics.

Problem 1:





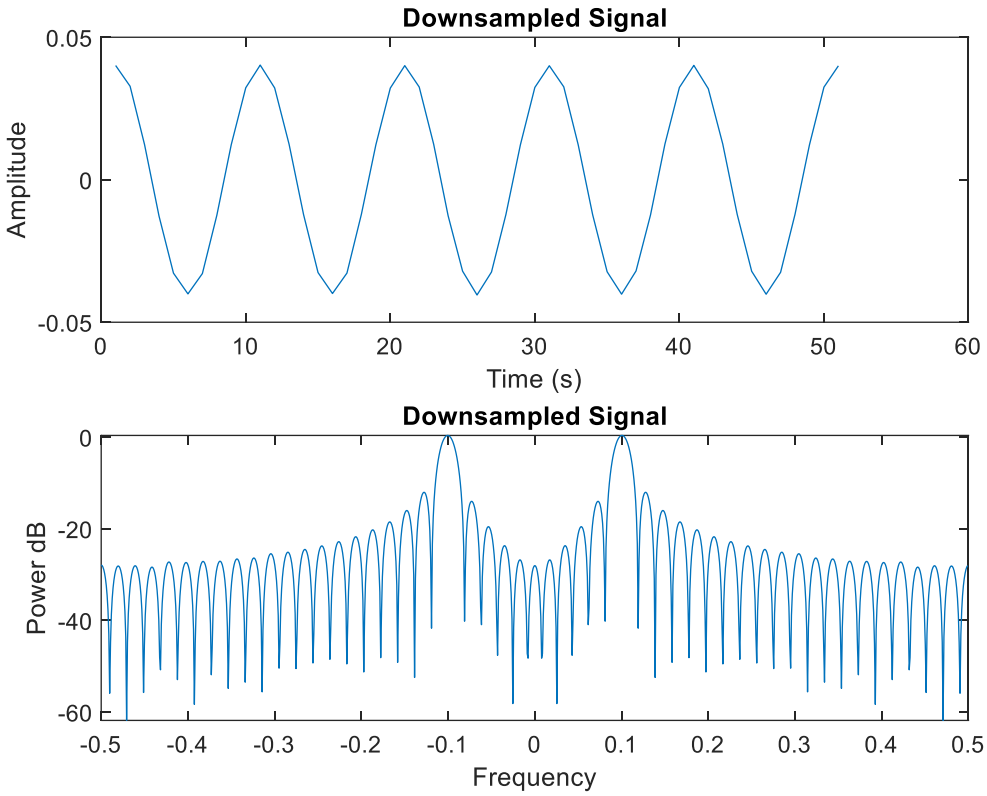




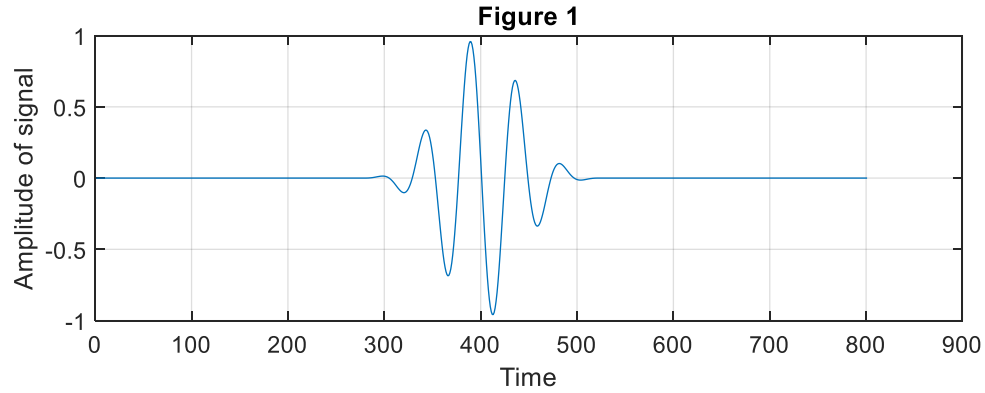
The downsampled signal in the time domain looks like the original signal but compressed along the x axis, and in the frequency domain, the signal looks stretched out.

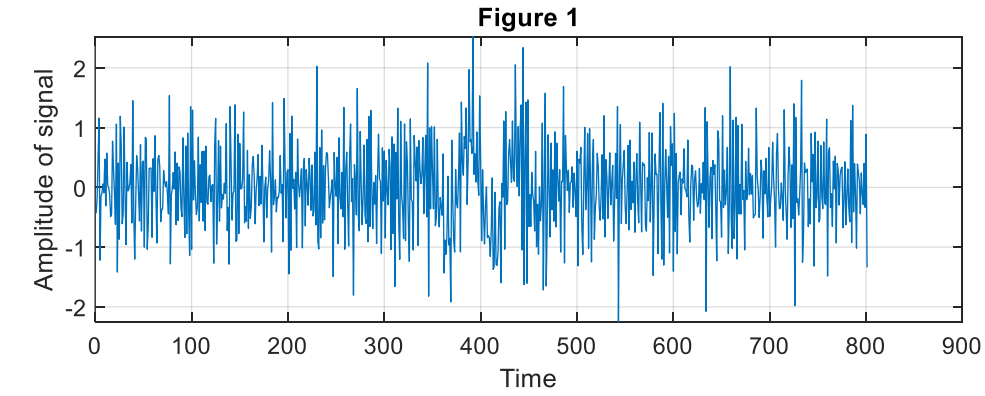
When we downsample, we are losing some information from the original signal and thus the new signal will look compressed. When we perform the fourier transformation a time compression is the

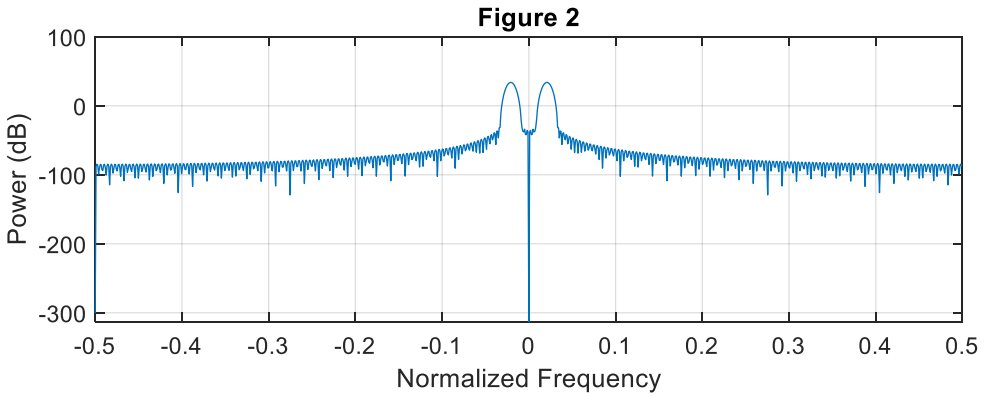
same as frequency stretching.

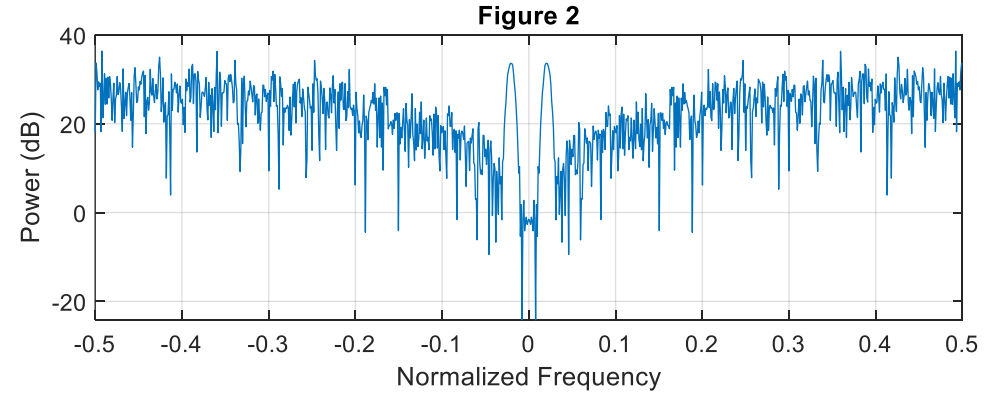


Problem 2:



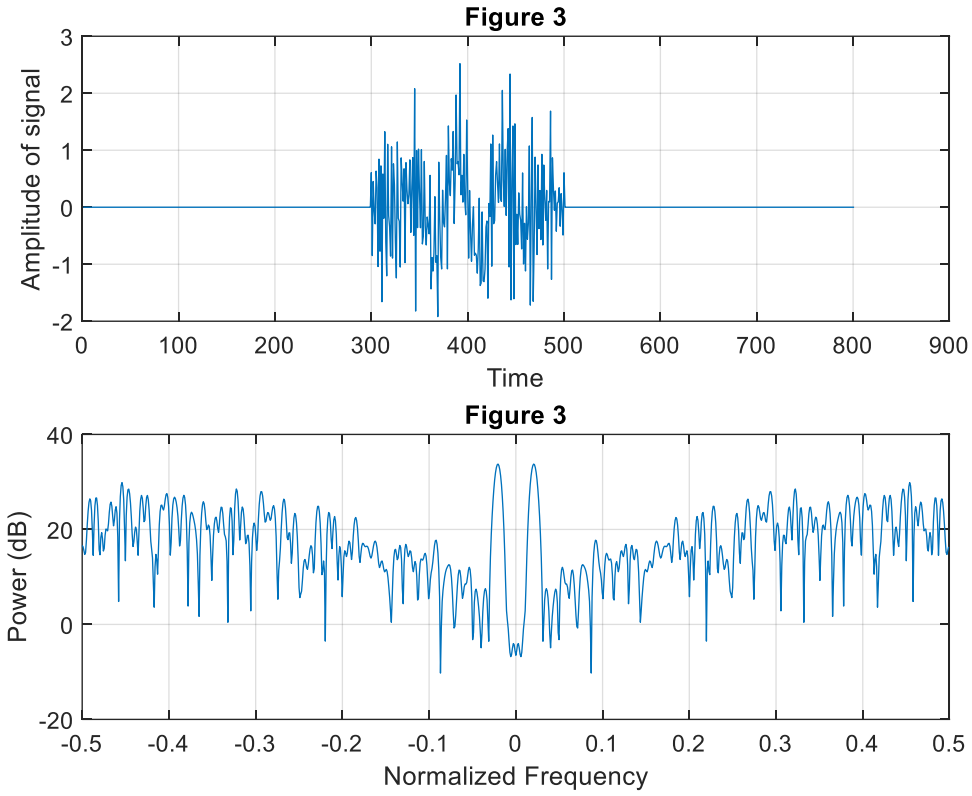




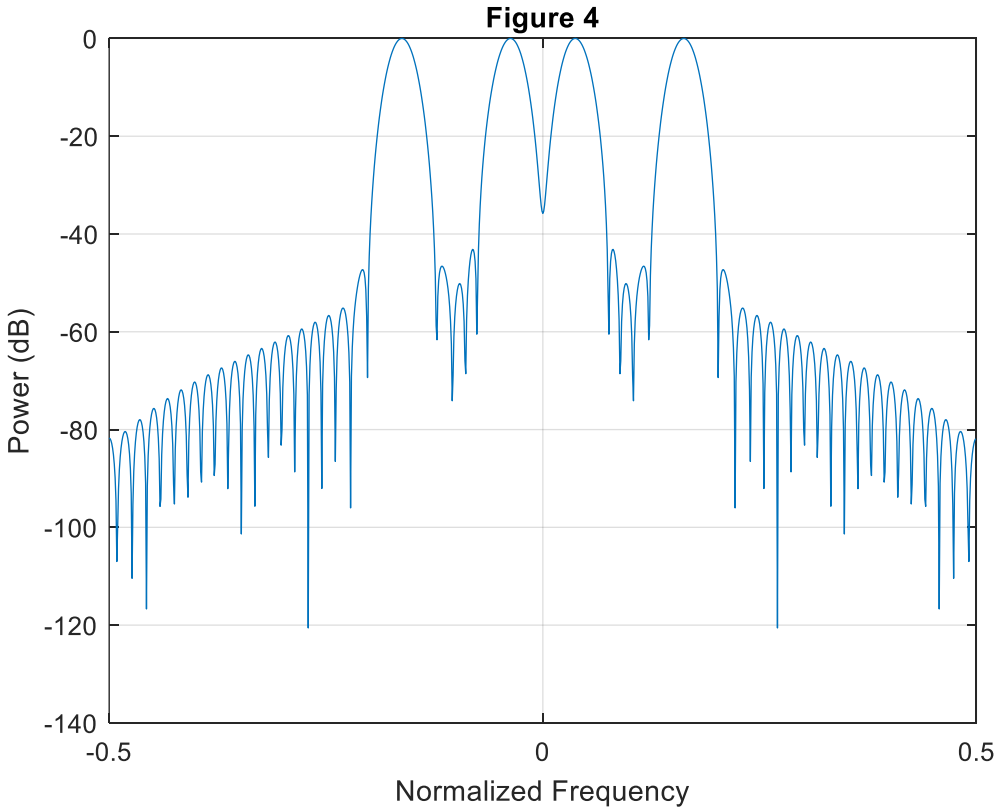


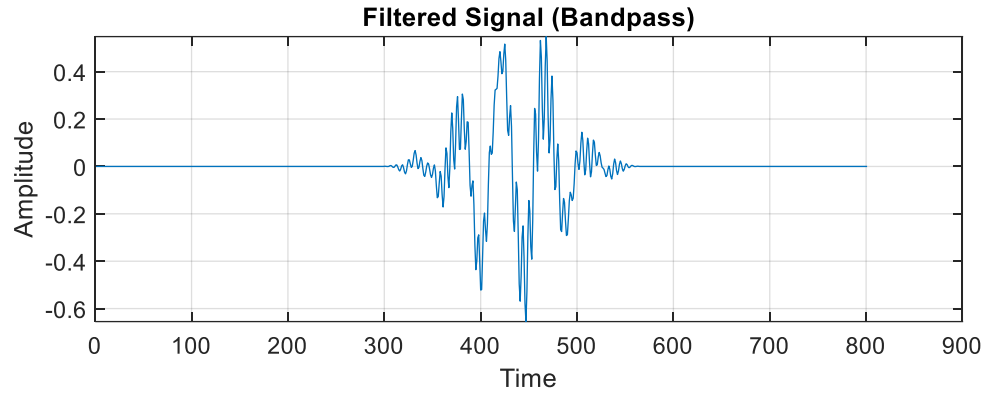
A bandpass filter looks like it would work well, after looking at figure 2 there is a lot of noise at high frequencies and low frequencies.

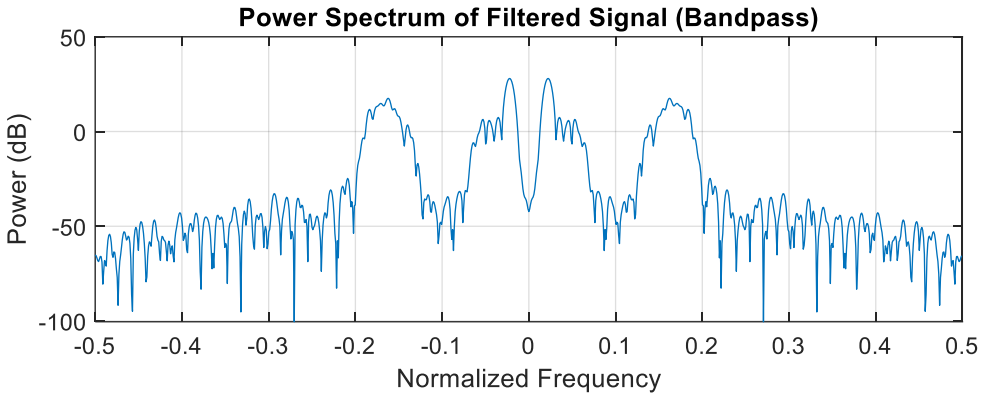
First I noticed that the signal from below t=300 and above t=500 is supposed to be 0 so I just set it to be that.

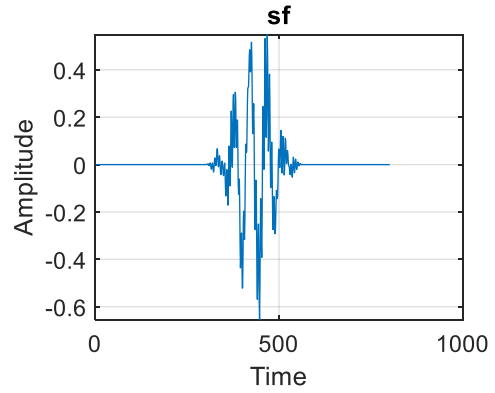


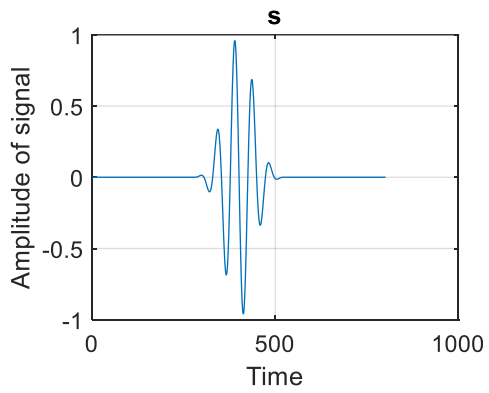
I created a bandpass filter with the power spectrum below.

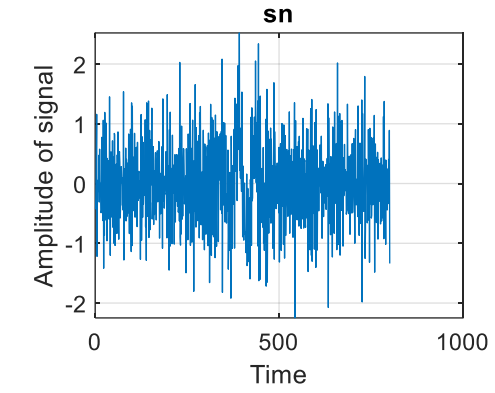












Average Quadratic Deviation (sf vs. s): 0.074258

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Average Quadratic Deviation (sf vs. sn): 0.56163

Noise Reduction: -8.7871 dB