Homework #1 (Due 9/6)


Problems: 1.5 and 1.6 – compute the spectral droop for the edge of the passband, edge of the stopband (of the first sampled spectral copy) and sketch the results. Repeat 1.5 and 1.6 by generating appropriate MATLAB functions and plotting the spectral distortion.

Problems: 2.1, 2.3, 2.4, and as a group 2.5, 2.6, 2.7, 2.8 using MATLAB and hand in plots and script. Compare the four results to each other.

Special Problem: Define the order of the Butterworth Filters required for a CD anti-aliasing filter and a DAT anti-aliasing filter. Repeat for 4x higher sampling rates for the CD and DAT filters. Note: Use Matlab to derive the filter coefficients and perform the Bode Plots for the CD filter spectrums on one plot and the DAT spectrum on a second plot (for the Bode Plots show attenuation in dB vs. log freq).

Note: Cut and Paste Matlab plots and scripts into MS Word or equivalent program and then type in your comments. **Please do not hand in pages of number or coefficients, figure out how to present information in a meaningful way that does not waste paper.**

Homework #2 (Due 9/13)


Problems: As a group {2.5, 2.9, 2.10, 2.11 use MATLAB and hand in plots and script. Compare the four results to each other}, as a group {2.12, 2.13 interpolation at two different rates}, 2.14 decimation zeros maintaining sample rate: same rate, different coefficient sets, and 2.15 decimated filter: same rate, different coefficient sets.

Problems: 3.1, 3.2, 3.3, 3.4

Note: 2.12 typos
h1 = sinc(-10:0.25:10).*Kaiser(81,6)' ; % filter of h = sinc .* window
plot( (0:0.25:20) , h1) ; % 81 sample filter requires 81 sample time range

Note: Cut and Paste Matlab plots and scripts into MS Word or equivalent program and then type in your comments. **Please do not hand in pages of number or coefficients, figure out how to present information in a meaningful way that does not waste paper.**
Homework #3 (Due 9/20)
Problems: 3.6 (verify Table 3.1), 3.7, 3.10, 3.11, 3.12, 3.13, 3.14, 3.15, 3.16, 3.18, 3.20, and 3.21

Special Problem #2: Generate four (4) frequency band-limited test signals. For example, capture music, find an appropriate wave file on-line, produce a frequency chirp, or simulate AM/ASK, PM/PSK or FM/FSK modulation formats. (The signal should be structures so that you could apply various filter designs to the waveform and observe the results!)

Homework #4 (Due 9/27)
Problems: 4.1, 4.2 (evaluate the corrected Matlab below), 4.3, {4.4, 4.5, 4.6}, {4.7, 4.8, 4.9, 4.10}

4.2 correction
h1 = tripuls([-1.0:0.1:1.0])';
h2 = (1+cos(pi*(-1.0:0.1:1.0))')/2;
h3 = h2.^2;
h4 = exp(-5*(-1.0:0.1:1.0)'.^2);
h5 = sinc(-1.0:0.1:1.0)';

For rcosine, if your license allows it, use it or use firrcos. Alternately, use the provided nyquistfilt and sqnyquistfilt functions (see web site).

See Dr. Bazuin’s examples

Exam #1 (9/27 to 10/4)

Homework #5 (Due 10/11)
Problems: 5.1, 5.2, 5.3, 5.4, 6.1, 6.2, 6.3, 6.4
6.4 typo: A Gaussian sequence should be \( \exp\left(-\frac{x^2}{2\cdot\sigma^2}\right) \) the minus is very important!

Homework #6 (due 10/25)
Problems: 7.1, 7.2, 7.3, 7.4, 7.5, {8.1, 8.2, 8.3}, and {8.4, 8.5, 8.6}
Project proposals are due.

Homework #7 (due 11/1)
Problems: {8.7, 8.8, 8.9}, 8.10, {9.1, 9.3}, {9.2, 9.4}, 9.5, and 9.6

Exam #2 (11/1 – 11/8)
Homework #8 (due 11/16)
Problems: 11.1, 11.2, 11.3, 11.4, 11.5, 11.6, 11.7, 11.8

Project Oral Presentation (12/4)

Project Reports Due (12/6)

Final (12/6-12/13) Due at end of regularly scheduled exam period.