Homework #9: Chapter 11 (due Fri. Dec. 7, 2012)

- All problems are worth +10 points unless otherwise noted.
- Code the following tools from *DSP Software Toolkit*: Chapter 7 **bttrwrth.m** (Orfanidis) and **chebyshv.m** (Orfanidis).
- Please attach at the *end* of your assignment printouts of **main1.m** (code to solve software problem 1), **main2.m** (code to solve software problem 2), etc... as well as any new tools developed in this assignment.
- When plotting magnitude spectra or magnitude responses in units of dB, there is no need to go below -70 dB since these values are extremely small and below typical quantization noise of the A/D converter.
- Since this assignment will not be graded and returned before the final exam, you may wish to copy it and bring it to your exam.
- As a reminder, the final exam is 10:30am - 12:30pm on Mon. Dec. 10, 2012.

Course Evaluation

Please complete the EE395 course/instructor evaluation using the online Canvas system. Attach a printout showing you completed the evaluation (no data) for +1 point extra credit added to the total grade. Your feedback and suggestions are highly valued by Prof. De Leon in order to improve the course.

Software Problems

Use your software tools to solve the following problems.

1. Use the bttrwrth.m tool to reproduce Fig. 11.6.3. Also, plot the magnitude response (in dB) and phase response for the filters.
2. On a single figure, plot $|H(\omega)|^2$ in normal units (not dB) of a Butterworth LPF with $\omega_c = 3\pi/5$ for orders 3, 8, and 15. Label each response and verify that $|H(\omega_c)|^2 = 0.5$. Plot the phase response and group delay of the 8th order Butterworth and note the non-linear phase.
3. Use the chebyshv.m tool to reproduce Fig. 11.6.11. Also, plot the magnitude response (in dB) and phase response for the filters.
4. On a single figure, plot $|H(\omega)|^2$ in normal units (not dB) of a Chebyshev LPF with $\omega_c = 3\pi/5$ for orders 3, 8, and 15 and passband ripple parameter, $\varepsilon = 0.3$. Also plot a "zoomed" in version of the passband. Label each response and verify/determine the following: (i) passband magnitude squared response ripples between 1 and $1/(1+\varepsilon^2)$, (ii) DC gain value, and (iii) $|H(\omega_c)|^2$ value.

Textbook Problems

None.