EE 123 DIGITAL SIGNAL PROCESSING, Spring 2009
Homework # 3, Due February 12, Thursday

1. Problem 6.24, Oppenheim and Schafer, 2nd ed.

2. Problem 6.29, Oppenheim and Schafer, 2nd ed.

3. Problem 6.31, Oppenheim and Schafer, 2nd ed.

4. Problem 6.36, Oppenheim and Schafer, 2nd ed.

5. Consider the fourth order IIR transfer function:

$$H(z) = \frac{0.3549 + 0.2002z^{-1} + 0.7031z^{-2} + 0.2002z^{-3} + 0.3549z^{-4}}{1 + 1.2522z^{-1} + 1.9448z^{-2} + 0.9774z^{-3} + 0.5595z^{-4}}.$$

   For the following questions, you may find the MATLAB `freqz`, `roots`, and `residuez` functions useful.

   a) Plot the frequency response $H(e^{j\omega})$ and identify the type of filter (lowpass, bandpass or highpass).

   b) Factorize $H(z)$ and develop two different cascade form realizations for $H(z)$.

   c) Develop a parallel form realization for $H(z)$.