

Homework #6
Due Tu. 5/02

1. (OS 6.50)
2. A sixth-order filter with system function

$$H(z) = \frac{(1 + z^{-2})(1 + z^{-1})^2(1 - 2 \cos(\frac{\pi}{6}) z^{-1} + z^{-2})}{(1 - 1.6 \cos(\frac{\pi}{4}) z^{-1} + 0.64 z^{-2})(1 + 1.6 \cos(\frac{\pi}{4}) z^{-1} + 0.64 z^{-2})(1 - 1.8 \cos(\frac{\pi}{4}) z^{-1} + 0.81 z^{-2})}$$

is to be implemented as a cascade of second-order sections. Considering only the effects of round-off noise, determine what is the best pole-zero pairing and the best ordering of the second-order sections.

Draw the pole/zero plot and give $H_i(z)$ for each of the $i = 1, 2, 3$ stages.

3. (OS 7.2)
4. (OS 7.4)
5. (OS 7.5)
6. (OS 7.9, 7.10)
7. (OS 7.13, 7.14)
8. (OS 7.22)