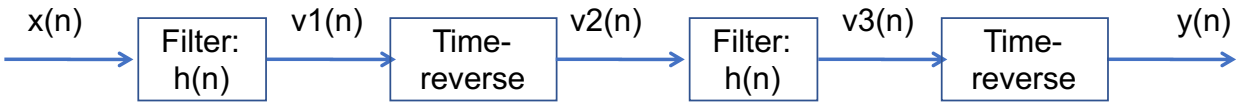
IIR Filter design HW

1) In Matlab3, you used the 'filtfilt' command to correct phase effects for FIR filters. The flowchart for the 'filtfilt' idea is below:



Assume the filter you are using has the form $H(\omega) = a(\omega) \exp(j\,\Phi(\omega))$, where the phase term $\Phi(\omega)$ may be non-linear. Using Fourier transform properties, write down the frequency-domain versions of all the signals above (v1, v2, v2, y) in term of $H(\omega)$ and $X(\omega)$. What is the group delay of the resulting filter?

2) P&M 10.10, but with three changes:
   a. instead of impulse invariance, use approx by derivatives
   b. look carefully at Example 10.3.1; it will save you lots of time
   c. compare both zeros and poles

Reminder: For bilinear, the mapping from s to z is given by Eq. 10.3.40.

3) P&M 10.17