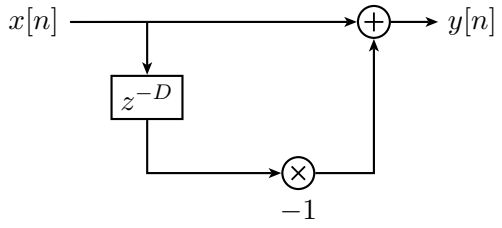
Extra Credit Assignment (20 points)

Problem E-1
The block diagram for a Comb filter is shown below. (a) Determine the difference equation, and (b) use the z-transform to derive the transfer function. Then, (c) determine the frequency response and the magnitude response. (d) Using Matlab, plot the magnitude and phase response for D=1,2,3. Is this a linear phase filter?



Problem E-2
The block diagram for a Integrator-Comb filter is shown below. This is part of a very efficient filter called a Cascade Integrator-Comb (CIC) filter use for changing the sample rate in a processing application. (a) Determine the difference equation, and (b) use the z-transform to derive the transfer function. Then, (c) determine the frequency response and the magnitude response. (d) Using Matlab, plot the magnitude and phase response for D=1, 2, 3. (e) Is this a linear phase filter? (f) How many multiplies and adds are required to implement this filter?