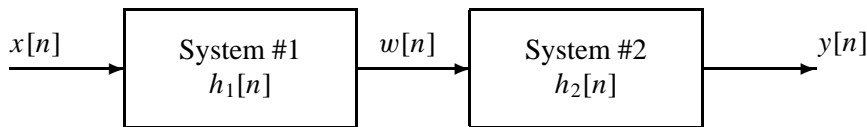




PROBLEM:

Shown in the figure below is a cascade of two linear time-invariant systems with impulse responses $h_1[n]$ and $h_2[n]$.



The impulse responses of the two systems are

$$h_1[n] = \delta[n] - \frac{1}{2}\delta[n-1] \quad h_2[n] = (0.25)^n u[n]$$

- (a) If $x[n] = \delta[n] + \delta[n-1]$, find the output of the first system, $w[n]$.
- (b) Determine the system function $H(z)$ for the cascade of the two systems. In other words, if $y[n] = x[n] * h[n]$, what is $H(z)$?
- (c) Make a plot of the poles and zeros of $H(z)$ in the z -plane, where $H(z)$ is the system function found in part (b).
- (d) If $x[n] = \delta[n] - (0.25)\delta[n-1]$, find the output of the cascade, $y[n]$.