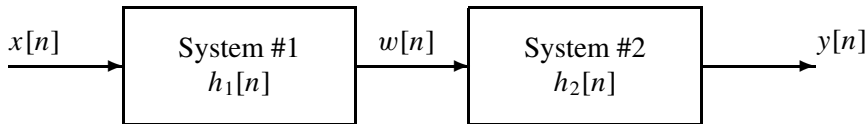


PROBLEM:

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

$$h_1[n] = \delta[n] - \frac{1}{3}\delta[n - 1] \quad h_2[n] = (0.5)^n u[n]$$

- If $x[n] = 3\delta[n] - 2\delta[n - 1]$, find the output of the first system, $w[n]$.
- 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 $H(z)$?
- 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).
- If $x[n] = \delta[n] - (0.5)\delta[n - 1]$, find the output of the cascade, $y[n]$.