

PROBLEM:

The diagram in Figure 1 depicts a *cascade connection* of two linear time-invariant systems.

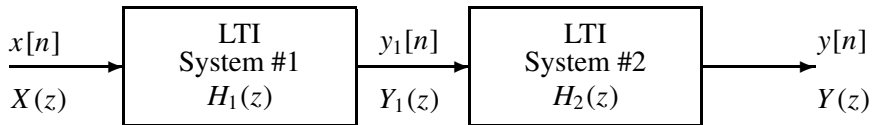
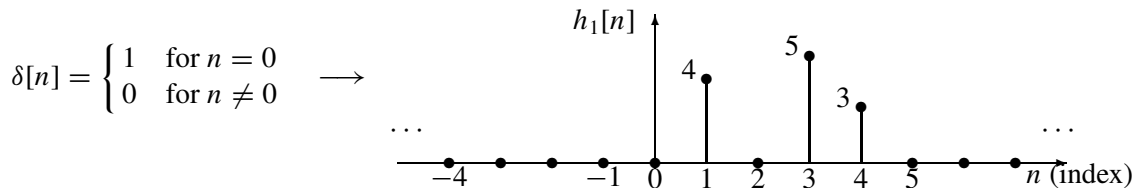


Figure 1: Cascade connection of two LTI systems.

- (a) Determine the filter coefficients $\{b_k\}$ of the first system: $y_1[n] = \sum_{k=0}^M b_k x[n - k]$

Assume that the impulse response from the first filter is the signal $h_1[n]$ shown below:



State clearly the value for the order M as well as all the coefficients.

- (b) Suppose that system #2 is described by the system function: $H_2(z) = \frac{10}{1 - \frac{2}{5}z^{-1}}$

Obtain the impulse response of the cascade, i.e., find $y[n]$ when $x[n] = \delta[n]$ in Figure 1.