

PROBLEM:

This problem is concerned with finding the output of an FIR filter for a given input signal. A linear time-invariant system is described by the difference equation

$$y[n] = \sum_{k=0}^4 (k+1)x[n-k]$$

The input to this system is *unit step* signal, denoted by $u[n]$, i.e., $x[n] = u[n] = \begin{cases} 0 & n < 0 \\ 1 & n \geq 0 \end{cases}$

- Determine the filter coefficients $\{b_k\}$ of this FIR filter.
- Determine the impulse response, $h[n]$, for this FIR filter. The impulse response is a discrete-time signal, so make a (stem) plot of $h[n]$ versus n .
- Use convolution to compute $y[n]$, over the range $-5 \leq n \leq \infty$, when the input is $u[n]$. Make a plot of $y[n]$ vs. n . (Hint: you might find it useful to check your results with MATLAB's `conv()` function.)