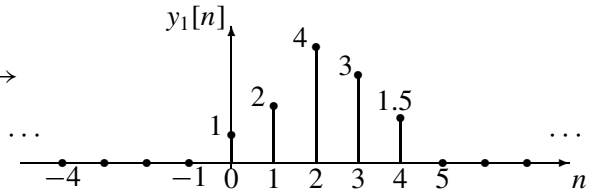
PROBLEM:

Answer the following questions about the time-domain response of FIR digital filters:

$$y[n] = \sum_{k=0}^{M} b_k \, x[n-k]$$

(a) When tested with an input signal that is a shifted impulse, $x_1[n] = \delta[n-1]$, the observed output from the filter is the signal $h[n]$ shown below:

$$\delta[n-1] = \begin{cases} 1 & \text{for } n = 1 \\ 0 & \text{for } n \neq 1 \end{cases} \longrightarrow$$



Use linearity and time-invariance to solve the following problem. Determine the output when the input to the LTI system is $x_2[n] = \delta[n] - \delta[n-2]$. Give your answer as a plot of $y_2[n]$ versus n, or a list of values for $-\infty < n < \infty$.

(b) Define the property of *causality.* Is this system *causal?*