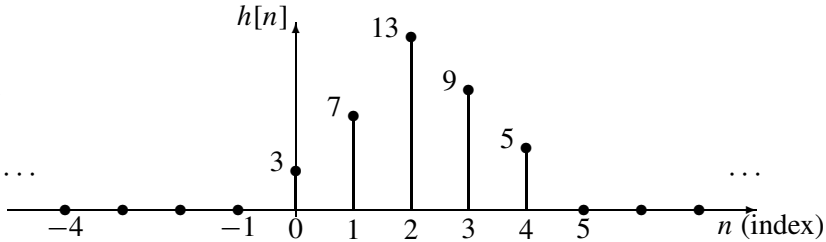
PROBLEM:

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) Determine the filter coefficients $\{b_k\}$ of an FIR filter. When tested with an input signal that is an impulse, $x[n] = \delta[n]$, the observed output from the filter is the signal $h[n]$ shown below:

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



(b) If the filter coefficients are $\{b_k\} = \{13, \ -13, \ 13\}$ and the input signal is

$$x[n] = \begin{cases} 0 & \text{for } n \text{ even} \\ 1 & \text{for } n \text{ odd} \end{cases}$$

determine the output signal $y[n]$ for all n. Give your answer as either a plot or a formula.