PROBLEM:

A *unit impulse sequence* is defined as

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

Suppose that a LTI system has a *z*-transform system function equal to

$$H(z) = 7 - 6z^{-1} - 5z^{-3} + 4z^{-4}$$

(a) Determine the difference equation that relates the output $y[n]$ of the system to the input $x[n]$.

(b) Determine and plot the *impulse response*: i.e., the output sequence $y[n]$ when the input is $x[n] = \delta[n]$. How is the output due to an impulse related to $H(z)$?

(c) Determine the step response, i.e., the output when the input is

$$u[n] = \begin{cases} 1 & \text{for } n \geq 0 \\ 0 & n < 0 \end{cases}$$