PROBLEM:

Given a feedback filter defined via the recursion:

$$y[n] = -0.9\, y[n-6] + x[n] \qquad \text{(DIFFERENCE EQUATION)} \qquad (1)$$

(a) When the input to the system is the following 3-point pulse signal:

$$x[n] = \begin{cases} +1 & \text{when } n = 0, 1, 2 \\ 0 & \text{elsewhere} \end{cases}$$

make a plot of the output signal $y[n]$ to show its important characteristics. Assume that the output signal is zero for $n < 0$.

(b) Find the z-transform operator representation for the system in (1).

(c) Find the poles of the system and plot their location in the z-plane.