

PROBLEM:

Given a feedback filter defined via the recursion:

$$y[n] = -y[n - 3] + x[n] \quad (\text{DIFFERENCE EQUATION})$$

- Determine the impulse response $h[n]$, assuming the “at rest” initial condition.
- Prove that the impulse response signal is periodic for $n > 0$, and determine the period.
- When the input to the system is the signal:

$$x[n] = \delta[n] + 2\delta[n - 3] + \delta[n - 6]$$

determine the output signal $y[n]$, assuming the “at rest” initial condition (i.e., the output signal is zero for $n < 0$). Present your final answer as a plot of all of $y[n]$.