

## PROBLEM:

Suppose that a LTI system has system function equal to

$$H(z) = 1 + z^{-4}$$

- Determine the difference equation that relates the output  $y[n]$  of the system to the input  $x[n]$ .
- Determine all the zeros of the  $z$ -transform system function,  $H(z)$ . In other words, solve  $H(z) = 0$ . Express your answer(s) in polar form.
- Suppose that the input signal is:

$$x[n] = \delta[n - 1] + 2\delta[n - 3] + 3\delta[n - 5]$$

Determine the output  $y[n]$  by using *convolution*.

- Demonstrate how the output of the system can also be obtained by multiplying  $H(z)$  times the polynomial:

$$X(z) = z^{-1} + 2z^{-3} + 3z^{-5}$$

Describe how the polynomial coefficients of  $X(z)$  and  $Y(z) = H(z)X(z)$  are related to  $x[n]$  and  $y[n]$ , respectively.