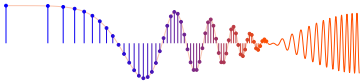

PROBLEM:

Suppose that a LTI system has system function equal to

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

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

(b) 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.

(c) 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.*

(d) 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.

McClellan, Schafer and Yoder, *Signal Processing First*, ISBN 0-13-065562-7.
Prentice Hall, Upper Saddle River, NJ 07458.