PROBLEM:

A linear time-invariant filter is described by the difference equation

$$y[n] = x[n] - 2x[n-1] - 2x[n-2] + x[n-3]$$

(a) *Impulse Response:* Determine the impulse response of this system. Plot $h[n]$ as a function of n.

(b) When the input to the system is $x[n] = \exp(j\pi n/4)$ determine the functional form for the output signal $y[n]$. Find numerical values for the magnitude and phase.

(c) What is the output if the input is

$$x[n] = 1 + 3\cos(0.25\pi(n-1))$$