PROBLEM:

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

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

(a) Find the frequency response $\mathcal{H}(\hat{\omega})$, and then express it as a mathematical formula, in polar form (magnitude and phase).

(b) Plot the magnitude and phase of $\mathcal{H}(\hat{\omega})$ as a function of $\hat{\omega}$ for $-\pi < \hat{\omega} < \pi$. Do this by hand, but you could check your answer by using the MATLAB function `freqz`.

(c) Find all frequencies, $\hat{\omega}$, for which the response to the input $e^{j\hat{\omega}n}$ is zero.