

PROBLEM:

A linear time-invariant filter is described by the difference equation (with feedback):

$$y[n] = 0.8y[n - 1] - 0.8x[n] + x[n - 1]$$

- Determine the system function $\mathcal{H}(z)$ for this system. Express $\mathcal{H}(z)$ as a ratio of polynomials in z^{-1} and as a ratio of polynomials in z .
- Plot the poles and zeros of $\mathcal{H}(z)$ in the z -plane.
- From $\mathcal{H}(z)$, obtain an expression for $\mathcal{H}(\hat{\omega})$, the frequency response of this system.
- Show that $|\mathcal{H}(\hat{\omega})|^2 = 1$ for all $\hat{\omega}$.