

PROBLEM:

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

$$y[n] = x[n] - x[n - 4]$$

(a) Find its system function $H(z)$.

(b) Plot the poles and zeros of $H(z)$ in the z -plane.

(c) Find the frequency response $H(e^{j\hat{\omega}})$ and express it in polar form (magnitude and phase).

Remember the “trick” $(1 - e^{-j\theta}) = e^{-j\theta/2}(e^{j\theta/2} - e^{-j\theta/2})$.

(d) Sketch $|H(e^{j\hat{\omega}})|$ for $-\pi < \hat{\omega} < \pi$.