

EE424 Homework 7

- 1) Consider a causal LTI system that is characterized by the difference equation

$$y[n] - \frac{5}{6}y[n-1] + \frac{1}{6}y[n-2] = x[n] - \frac{1}{4}x[n-1]$$

Determine

- (a) The frequency response $H(e^{j\omega})$ for the system.
- (b) The impulse response $h[n]$ for the system.
- (c) The output $y[n]$ if the input is $x[n] = \left(\frac{1}{4}\right)^n u[n]$

- 2) A causal LTI system has the property that

$$\left(\frac{1}{2}\right)^n u[n] \rightarrow (n+1)\left(\frac{1}{2}\right)^n u[n]$$

Determine

- (a) The frequency response $H(e^{j\omega})$ for the system.
- (b) The impulse response $h[n]$ for the system.
- (c) A difference equation relating any input $x[n]$ and the corresponding output $y[n]$.

- 3) Use MATLAB to plot the magnitude response $|H(e^{j\omega})|$ over the band $0 \leq \omega \leq \pi$ for a system described by the difference equation

$$y[n] - 0.36953y[n-1] + 0.19582y[n-2] = 0.20657x[n] + 0.41314x[n-1] + 0.20657x[n-2]$$