

Homework 4

Problems:

- 1) Consider the system described by $y[n] + 2y[n-2] = x[n] - x[n-3]$, and initial rest.
 - a) Find $h[n]$
 - b) Find $H(z)$.
 - c) Find $y[n]$ the output of the system to $x[n] = \cos(\omega n)$.
 - d) Can you find ω such that the output is zero?
- 2) Consider the system with impulse response

$$h[n] = \begin{cases} 1 & 0 \leq n \leq 6 \\ 0 & \text{otherwise} \end{cases}$$

- a) Find $H(z)$.
 - b) Find $y[n]$ the output of the system to $x[n] = (-1)^{\frac{n}{2}}$.
 - c) Roughly plot $|H(e^{j\omega})|$ as a function of ω . What kind of filter is this?
- 3) Consider the system with impulse response

$$h[n] = \begin{cases} 1 & n = 0 \\ -1 & n = 1 \\ 0 & \text{otherwise} \end{cases}$$

- a) Find $H(z)$.
 - b) Find $y[n]$ the output of the system to the pulse train $x[n] = \Pi_{N_1, N}[n]$.
 - c) Roughly plot $|H(e^{j\omega})|$ as a function of ω . What kind of filter is this?