

# Homework 4

## Problems:

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

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

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

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

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