

# Exercises Week 10

## DSP

### Left-overs from last week:

7. Compute  $x[n]$  in Ex.3 and Ex.4, in two ways:

- using the definition formula
- using the matrix form

### New exercises

1. A signal  $x[n]$  has a Z transform with one pole  $p_1 = -0.5$  and one zero  $z_1 = 0.9$ . It is known that at  $\omega = \pi$ , the modulus of the Fourier transform is  $|X(\omega = \pi)| = 1$ .
  - a. Find the signals's Z transform  $X(z)$
  - b. Compute the expression of  $|X(\omega)|$  and  $\angle X(\omega)$
  - c. Find the values  $|X(\frac{\pi}{2})|$ ,  $|X(\frac{-\pi}{2})|$  and  $|X(0)|$
  - d. Sketch  $|X(\omega)|$
2. Design the pole-zero plot of a signal with:
  - low frequency content
  - frequency content around the frequency  $\omega = \frac{\pi}{2}$