# Exercises Week 11

## DSP

1. Find the DTFT of the signal $\{1, 1, 0, 0\}$, considering it is surrounded with infinitely-long zeros on both sides.

   Discussion: What is the relation of this DTFT with the DFT of exercise 5 from last week?

2. 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 $|X(\omega)|$

4. Design the pole-zero plot of a signal with:

   - low frequency content
   - frequency content around the frequency $\omega = \frac{\pi}{2}$