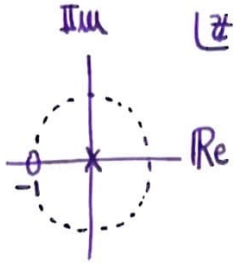
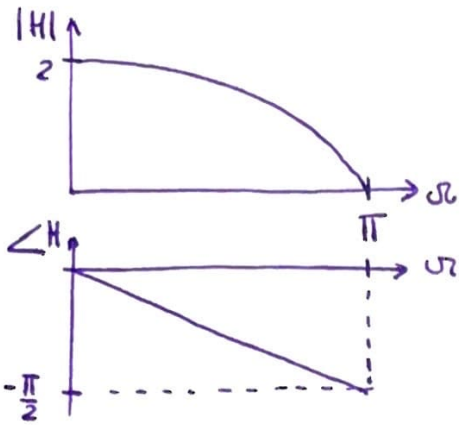
a) $h_1(k) = (1,1)$ $\quad h_2(k) = (1,1,1)$

$$H_1(z) = 1 + z^{-1} = \frac{1+z}{z} \longrightarrow$$

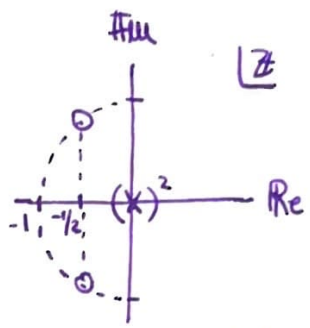


$$H(z=e^{j\Omega}) = 1 + e^{-j\Omega} = e^{-j\frac{\Omega}{2}}\left(e^{j\frac{\Omega}{2}} + e^{-j\frac{\Omega}{2}}\right) = e^{-j\frac{\Omega}{2}} \cdot 2\cos(\Omega/2) \longrightarrow |H_1(e^{j\Omega})| = 2\cos(\Omega/2)$$

$$\angle H_1(e^{j\Omega}) = -\Omega/2$$

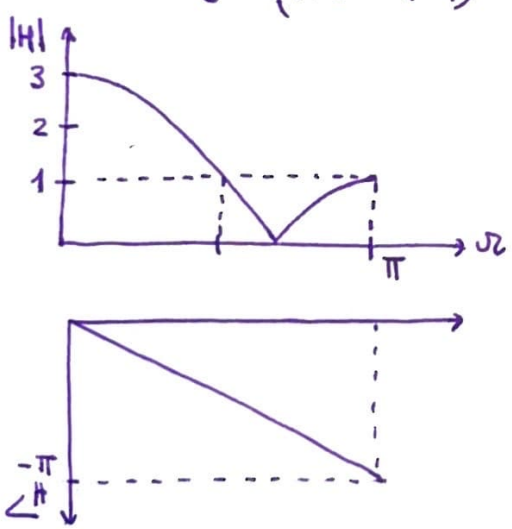


$$H_2(z) = 1 + z^{-1} + z^{-2} = \frac{z^2+z+1}{z^2} \longrightarrow \text{ceros: } \frac{-1 \pm \sqrt{3}j}{2}$$



$$H_2(z=e^{j\Omega}) = 1 + e^{-j\Omega} + e^{-j2\Omega} = e^{-j\Omega}\left(e^{j\Omega} + 1 + e^{-j\Omega}\right)$$

$$= e^{-j\Omega}\left(1 + 2\cos(\Omega)\right) \longrightarrow |H_2(e^{j\Omega})| = 1 + 2\cos(\Omega) \quad \angle H_2(e^{j\Omega}) = -\Omega$$



1. Para que $h_1(k)$ represente la media aritmética debe dividirse la salida por 2.
   Para que $h_2(k)$ represente la media aritmética debe dividirse su salida por 3.

2. $1 + 2\cos(\Omega) = 0 \rightarrow \cos(\Omega) = -1/2 \rightarrow \Omega = \cos^{-1}(-1/2) = \frac{2\pi}{3}$

   $2\pi = f_s \rightarrow f_s = 3 \cdot \Omega = 3 \cdot 50\,Hz = 150\,Hz$