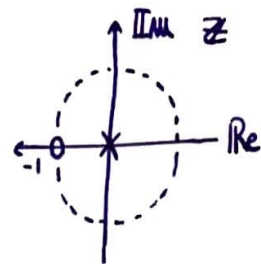
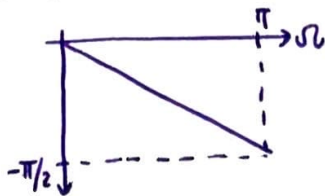
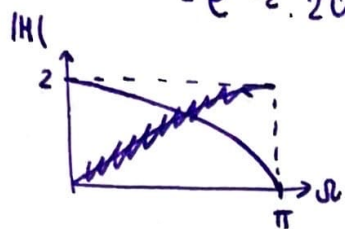


a) $h_1(k) = (1, 1)$ $H(z) = 1 \cdot z^1 + 1 \cdot z^0 = 1 + z^{-1} = \frac{z+1}{z} \rightarrow$



$$H_1(\omega) = H_1(z) \big|_{z=e^{j\omega}} = 1 + e^{-j\omega} = e^{-j\frac{\omega}{2}} (e^{j\frac{\omega}{2}} + e^{-j\frac{\omega}{2}})$$

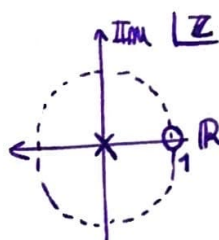
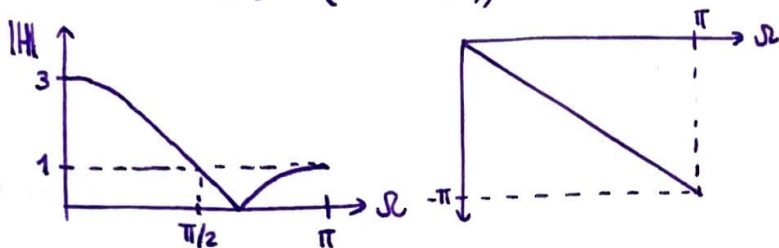
$$= e^{-j\frac{\omega}{2}} \cdot 2 \cos(\omega/2) \rightarrow |H_1(\omega)| = 2 \cos(\omega/2) \quad \angle H_1(\omega) = -\omega/2$$



$h_2(k) = (1, 1, 1)$ $H(z) = z^2 + z + 1 = 1 + z^{-1} + z^{-2} = \frac{1+z+z^2}{z^2} \rightarrow$ zeros: $-\frac{1}{2} \pm j\frac{\sqrt{3}}{2}j$

$$H_2(\omega) = H_2(z) \big|_{z=e^{j\omega}} = 1 + e^{-j\omega} + e^{-j2\omega} = e^{-j\omega} (1 + e^{j\omega} + e^{-j\omega})$$

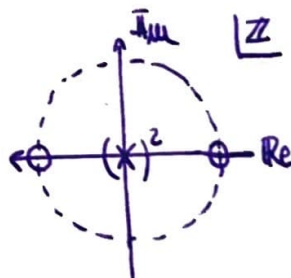
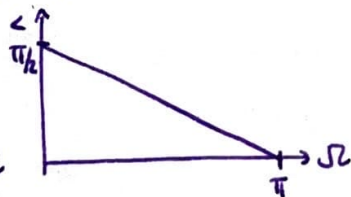
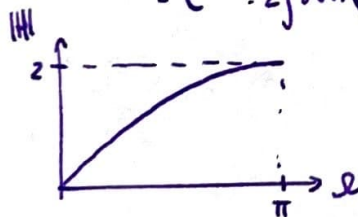
$$= e^{-j\omega} (1 + 2 \cos(\omega)) \rightarrow |H_2(\omega)| = 1 + 2 \cos(\omega) \quad \angle H_2(\omega) = -\omega$$



b) $h_1(k) = (1, -1)$ $H(z) = 1 - z^{-1} = \frac{z-1}{z} \rightarrow$

$$H_1(\omega) = 1 - e^{-j\omega} = e^{-j\frac{\omega}{2}} (e^{j\frac{\omega}{2}} - e^{-j\frac{\omega}{2}})$$

$$= e^{-j\frac{\omega}{2}} \cdot 2j \sin(\omega/2) = e^{-j(\frac{\omega}{2} + \frac{\pi}{2})} \cdot 2 \sin(\omega/2) \rightarrow |H_1(\omega)| = 2 \sin(\omega/2) \quad \angle H_1(\omega) = \frac{\pi - \omega}{2}$$



$h_2(k) = (1, 0, -1)$ $H(z) = 1 - z^{-2} = \frac{z^2-1}{z^2}$

$$H_2(\omega) = 1 - e^{-j2\omega} = e^{-j\omega} (e^{j\omega} - e^{-j\omega}) \Rightarrow |H_2(\omega)| = 2 \sin(\omega) \quad \angle H_2(\omega) = \frac{\pi}{2} - \omega$$

$$\Rightarrow |H_2(\omega)| = 2 \sin(\omega) \quad \angle H_2(\omega) = \frac{\pi}{2} - \omega$$

