TS6-d

d) $y(n) = x(n) - x(n-2)$

$Y(z) = X(z) - X(z) \cdot z^{-2}$

$T(z) = \dfrac{Y(z)}{X(z)} = 1 - z^{-2} = \dfrac{z^2 - 1}{z^2}$

$T(j\Omega) = \dfrac{e^{2j\Omega} - e^{0j\Omega}}{e^{2j\Omega}} = \dfrac{e^{j\Omega}\left(e^{j\Omega} - e^{-j\Omega}\right)}{e^{2j\Omega}}$

$= e^{-j\Omega}\left(2j\,\mathrm{sen}(\Omega)\right) = j\,e^{-j\Omega}\left(2\,\mathrm{sen}(\Omega)\right)$ $\longrightarrow$ $2\,\mathrm{sen}(\Omega) = 0$

$\Omega = K\pi \ , \ K \in \mathbb{N}$

$j \cdot \left[\cos(-\Omega) + j\,\mathrm{sen}(-\Omega)\right]$

$j \cdot \left[\cos(\Omega) - j\,\mathrm{sen}(\Omega)\right]$

$\underbrace{\mathrm{sen}(\Omega)}_{a} + j\,\underbrace{\cos(\Omega)}_{b}$

$\cos(\Omega - \pi/2) - j\,\mathrm{sen}(\Omega - \pi/2)$

$\cos(\Omega)\cancel{\cos(\pi/2)}^{1} + \mathrm{sen}(\Omega)\,\mathrm{sen}(\pi/2) - j\left(\mathrm{sen}(\Omega)\cdot\cancel{\cos(\pi/2)}^{1} - \mathrm{sen}(\pi/2)\cos(\Omega)\right)$

$\mathrm{sen}(\Omega) - j\left(-\cos(\Omega)\right)$

$\mathrm{sen}(\Omega) + j\cos(\Omega)$

$\mathrm{tg}\,\alpha = \dfrac{b}{a} = \dfrac{\cos(\Omega)}{\mathrm{sen}(\Omega)} = \cot(\Omega)$

$\alpha = \mathrm{arctg}\left(\cot(\Omega)\right) = \mathrm{arctg}\left(\mathrm{tg}\left(\pi/2 - \Omega\right)\right)$

$\alpha = \pi/2 - \Omega$

$j\,e^{-j\Omega} = e^{j\underbrace{(\pi/2 - \Omega)}_{fase}} = e^{-j(\Omega - \pi/2)}$

$$\boxed{\;|T(\Omega)| = 2\,\mathrm{sen}(\Omega)\;\\[6pt] \sphericalangle\, T(\Omega) = \pi/2 - \Omega\;}$$