

$$b) \quad y(n) = x(n-4) + x(n-3) + x(n-2) + x(n-1) + x(n)$$

$$Y(z) = X(z) \cdot z^{-4} + X(z) \cdot z^{-3} + X(z) \cdot z^{-2} + X(z) \cdot z^{-1} + X(z)$$

$$Y(z) = X(z) \cdot (z^{-4} + z^{-3} + z^{-2} + z^{-1} + 1)$$

$$T(z) = \frac{Y(z)}{X(z)} = z^{-4} + z^{-3} + z^{-2} + z^{-1} + z^0 = \frac{1 + z^1 + z^2 + z^3 + z^4}{z^4}$$

$$T(j\Omega) = \frac{e^{0j\Omega} + e^{1j\Omega} + e^{2j\Omega} + e^{3j\Omega} + e^{4j\Omega}}{e^{4j\Omega}}$$

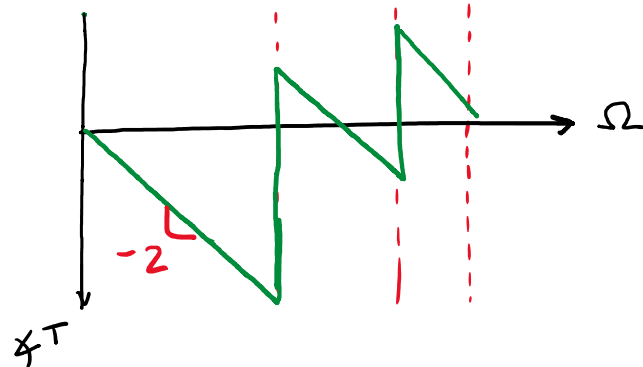
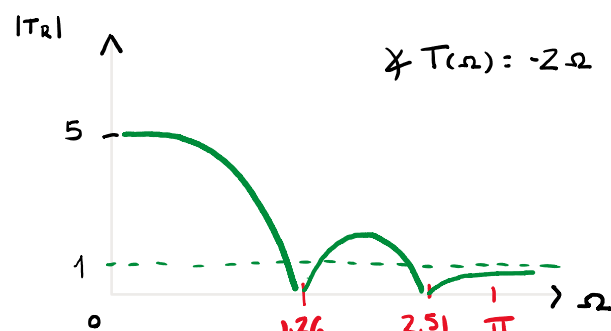
$$= e^{2j\Omega} (e^{-2j\Omega} + e^{-j\Omega} + e^0 + e^{j\Omega} + e^{2j\Omega})$$

$$= e^{\underline{-2j\Omega}} (2 \cos(2\Omega) + 2 \cos(\Omega) + 1) \longrightarrow$$

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$$|T(\Omega)| = 2 \cos(2\Omega) + 2 \cos(\Omega) + 1$$

$$\angle T(\Omega) = -2\Omega$$



$$1 + 2 \cos(2\Omega) + 2 \cos(\Omega) = 0$$

$$1 + 2(2 \cos^2(\Omega) - 1) + 2 \cos(\Omega) = 0$$

$$1 + 4 \cos^2(\Omega) - 2 + 2 \cos(\Omega) = 0$$

$$4 \cos^2(\Omega) + 2 \cos(\Omega) - 1 = 0$$

$$\cos(\Omega) = \frac{-2 \pm \sqrt{4 - 4 \cdot 4 \cdot (-1)}}{8} = \frac{-2 \pm \sqrt{20}}{8} \approx 0.31 \rightarrow \Omega \approx 1.257$$

$$\cos(\Omega) = \frac{-2 - \sqrt{20}}{8} \approx -0.81 \rightarrow \Omega \approx 2.51$$

z

