Trejo Picazo Aldo

Tarea 10

Transformada de Fourier

1) $\mathcal{F}\{\cos \omega t\} \Longrightarrow$ con la identidad de Euler

$$\cos(\omega t) = \frac{1}{2}\left(e^{-j\omega t} + e^{j\omega t}\right)$$

$$\mathcal{F}(\cos \omega t) = \mathcal{F}\left\{\frac{1}{2}\left(e^{-j\omega t} + e^{j\omega t}\right)\right\}$$

$$= \frac{1}{2}\mathcal{F}\left(e^{j\omega t}\right) + \frac{1}{2}\mathcal{F}\left(e^{-j\omega t}\right)$$

$$= \frac{1}{2}\left(2\pi\delta(\omega - \omega_0) + 2\pi\delta(\omega + \omega_0)\right)$$

$$\mathcal{F}\{\cos \omega t\} = \pi\left(\delta(\omega - \omega_0) + \delta(\omega + \omega_0)\right)$$

2) $\mathcal{F}\{\operatorname{sen} \omega t\} \Rightarrow$ con identidad de Euler

$$\operatorname{sen}(\omega t) = \frac{1}{2j}\left(e^{-j\omega t} - e^{j\omega t}\right)$$

$$\mathcal{F}\{\operatorname{sen} \omega t\} = \mathcal{F}\left\{\frac{1}{2j}\left(e^{-j\omega t} - e^{j\omega t}\right)\right\}$$

$$= \frac{1}{2j}\mathcal{F}\left(e^{j\omega t}\right) - \frac{1}{2j}\mathcal{F}\left(e^{-j\omega t}\right)$$

$$= \frac{1}{2j}\left(2\pi\delta(\omega - \omega_0) - 2\pi\delta(\omega + \omega_0)\right)$$

$$\mathcal{F}\{\operatorname{sen}(\omega t)\} = \frac{\pi}{j}\left(\delta(\omega - \omega_0) + \delta(\omega + \omega_0)\right)$$