Santiago Ramírez Arenas. - Quizz Comunicaciones

$T=8$

$\omega_0 = \frac{2\pi}{8} = \frac{\pi}{4}$ $\quad C_n = \frac{1}{T}\int_T f(t)\, e^{-in\omega_0 t}$

$$f(t) \begin{cases} t+6 & -6 \le t \le -2 \\ 2-t & -2 \le t \le 2 \end{cases}$$

- $f(t) = \sum_{n=-\infty}^{\infty} C_n e^{in\omega_0 t}$

- $C_n = \frac{1}{8}\left(\int_{-6}^{-2}(t+6)\, e^{in\omega_0 t}\, dt + \int_{-2}^{2}(2-t)\, e^{-in\omega_0 t}\, dt\right)$

- Comienzo la integración

$u = t+6 \quad dv = e^{-in\omega_0 t}$

$du = dt \quad v = \frac{1}{-in\omega_0}$

$v = (2-t) \quad dv = e^{-}$

$du = -dt$

$$C_n = \frac{1}{8}\left(\frac{t+6}{-in\omega_0} e^{-in\omega_0 t} - \frac{1}{in\omega_0}\int_{-6}^{-2} e^{-in\omega_0 t}\, dt + \frac{(2-t)}{-in\omega_0} e^{-in\omega_0 t} + \frac{}{-i}\right.$$

$$C_n = \frac{1}{8}\left[\left(\frac{(t+6)}{-in\omega_0} e^{-in\omega_0 t} - \frac{1}{-i^2 n^2 \omega_0^2} e^{-in\omega_0 t}\Big|_{-6}^{-2}\right)\right.$$

$$\left.\left. + \left(\frac{(2-t)}{-in\omega_0} e^{-in\omega_0 t} + \frac{1}{-i^2 n^2 \omega_0^2} e^{-in\omega_0 t}\Big|_{-2}^{2}\right)\right) =\right.$$

$$C_n = \frac{1}{8}\left(\left(\frac{4}{-in\omega_0} e^{-2in\omega_0} + \frac{e^{2in\omega_0}}{n^2\omega_0^2} - \frac{e^{6jn\omega_0}}{n^2\omega_0^2}\right) + \right.$$

$$\left.\left(\frac{4}{in\omega_0} e^{2in\omega_0} - \frac{e^{-in\omega_0^2}}{n^2\omega_0^2} + \frac{e^{2in\omega_0}}{n^2\omega_0^2}\right)\right)$$

$$C_n = \frac{1}{8}\left(\frac{e}{n^2\omega_0^2} - \frac{e^{6jn\omega_0}}{n^2\omega_0^2} - \frac{e^{-2jn\omega_0}}{n^2\omega_0^2} + \frac{e}{n^2\omega_0^2} \right)$$

$$C_n = \frac{1}{8n^2\omega_0^2}\left[e^{2jn\omega_0} - e^{6jn\omega_0} - e^{-2jn\omega_0} + e^{2jn\omega_0} \right]$$

$$C_n = \frac{1}{8n^2\omega_0^2}\left[2e^{4jn\omega_0} - \left(e^{6jn\omega_0} + e^{-2jn\omega_0} \right) \right] =$$

$$C_n = \frac{1}{8n^2\omega_0^2}\left(2e^{2jn\omega_0} - e^{2jn\omega_0}\left(e^{4jn\omega_0} + e^{-4jn\omega_0} \right) \right)$$

$$C_n = \frac{1}{8n^2\omega_0^2}\left[2e^{2jn\omega_0} - e^{2jn\omega_0} \cdot 2\cos(n\pi) \right]$$

$$C_n = \frac{1}{8n^2\omega_0^2}\left(e^{2jn\omega_0}\left(2 - 2\cos(n\pi) \right) \right]$$

$$e^{2jn\omega_0}\left(2 - 2\cos(n\pi) \right) \longrightarrow (-1)^n$$

$$C_0 = \frac{1}{8n^2\omega_0^2}$$

$$C_n = \frac{2}{\pi^2 n^2} \cdot e^{2jn\omega_0}\left(2\left(1 - \cos(n\pi) \right) \right)$$

$$C_n = \frac{4}{\pi^2 n^2} e^{2jn\omega_0}\left(1 - (-1)^n \right)$$

$$C_n = \frac{4}{\pi^2 n^2} \cos\left(\frac{n\pi}{2}\right) + j\,\mathrm{Sen}\left(\frac{n\pi}{2}\right)\left(1 - (-1)^n \right)$$