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1 a

$$G(\omega) = \int_{-\infty}^{\infty} g(t) \cdot e^{-j\omega t} \, dt$$

$i = j = \sqrt{-1}$

$g_n = 2 + t$ $\qquad$ $g_p = 2 - t$

$$G(\omega) = \int_{-2}^{0} (2+t) \cdot e^{-j\omega t} \, dt + \int_{0}^{2} (2-t) \cdot e^{-j\omega t} \, dt$$

$$G(\omega) = \frac{2e^{-2i\omega}\left(-2i\omega + e^{2i\omega} - 1\right)}{\omega^2}$$

① b

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$$D_n = \frac{1}{T_0}\int_{T_0} g(t) \cdot e^{-jn\omega_0 t}\, dt$$

$g_n = 2+t \qquad g_p = 2-t$

$\omega_0 = 2\pi f \qquad f = \frac{1}{T_0} = \frac{1}{4}$

$\omega_0 = \pi/2$

$$D_n = \frac{1}{T_0}\int_{-2}^{0} (2+t)\cdot e^{-jn\omega_0 t}\, dt + \int_{0}^{2} (2-t)\cdot e^{-jn\omega_0 t}\, dt$$

$$e^{-jn\frac{\pi}{2}t} = \left(e^{-j\frac{\pi}{2}}\right)^{nt} = \left[\cos\tfrac{\pi}{2} - j\,\mathrm{sen}\tfrac{\pi}{2}\right]^{nt} = -1j^{nt} = -j^{nt}$$

$$D_n = \frac{1}{4}\underbrace{\int_{-2}^{0} (2+t)\cdot -j^{nt}\, dt}_{} + \int_{0}^{2} (2-t)\cdot -j^{nt}\, dt$$

$$D_n = \frac{1}{\cancel{4}}\left(\frac{-\cancel{4}j\pi n - \cancel{4}e^{j\pi n} + \cancel{4}}{\pi^2 n^2}\right) + \frac{1}{\cancel{4}}\left(\frac{-\cancel{4}j\pi n - \cancel{4}e^{j\pi n} - \cancel{4}}{\pi^2\cdot n^2}\right)$$

$$D_n = \frac{-e^{-j\pi n} - e^{-j\pi n} + 2}{\pi^2 n^2}$$

$$D_n = \frac{-2e^{-j\pi n} + 2}{\pi^2 \cdot n^2} \quad \leadsto 2e^{-j\pi n} = 2[\cos\pi n - \cancel{j\,\mathrm{sen}\,\pi n}^{\,0}) = 2$$

$D[1] = 0{,}40528$

$D[2] = 0$

$$D_n = \frac{-2\cos\pi n + 2}{\pi^2 \cdot n^2} =$$

$D[3] = 0{,}0450316$

2 a e b

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$$G(\omega) = \int_0^2 t \cdot e^{-j\omega_0 t}\, dt + \int_2^6 (4-t) \cdot e^{-j\omega_0 t}\, dt + \int_6^8 (t-8)\, e^{-j\omega_0}$$

$$G(\omega) = \frac{16\, i\, e^{-4 i \omega}\, sen^3(\omega) \cdot \cos(\omega)}{\omega^2}$$

$\omega_0 = \pi/4$

$$D_n = \frac{G(\omega_0 n)}{T_0} = \frac{2 \cdot i\, e^{-4 i \omega_0 n} \cdot sen^3(\omega_0 n) \cdot \cos(\omega_0 n)}{(\omega_0 \cdot n)^2} \Rightarrow G(\tfrac{\pi}{4} n)$$

$$* \; D_n[n] = \frac{2 \cdot i \left(e^{-\pi i n} \cdot sen^3(\pi/4\, n) \cdot \cos(\pi/4 \cdot n) \right)}{\left(\frac{\pi n}{4}\right)^2}$$