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Bsee 19047

Q1 $x(t) = \begin{cases} 1.5 & 0 < t < 1 \\ -1.5 & 1 < t < 2 \end{cases}$ $\omega_0 = \pi$ $\omega = \frac{2\pi}{T}$ $T = \frac{2\pi}{\pi} = 2$

$$a_k = \frac{1}{2}\int_0^2 x(t)\, e^{-jk\pi t}\, dt$$

$$= \frac{1}{2}\int_0^1 1.5\, e^{-jk\pi t} - \frac{1}{2}\int_1^2 1.5\, e^{-jk\pi t}$$

$$= \frac{1}{2}(1.5)\frac{e^{-jk\pi t}}{-jk\pi}\Bigg|_0^1 - \frac{1}{2}(1.5)\frac{e^{-jk\pi t}}{-jk\pi}\Bigg|_1^2$$

$$= \frac{k}{2}\, 0.75\, \frac{e^{-jk\pi}}{-jk\pi}$$

$$a_k = \frac{3}{2k\pi j}\left(1 - e^{-jk\pi}\right) \Rightarrow \frac{3}{k\pi} e^{-jk(\pi/2)} \sin\left(\frac{k\pi}{2}\right) = a_k$$

$$a_0 = \frac{1}{2}\int_0^1 1.5\,dt - \frac{1}{2}\int_1^2 1.5\,dt = 0$$

Q:- 2 $x(t) = e^{-3t} \sin 2t$

solve

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

$$x(j\omega) = \int_{-\infty}^{\infty} (e^{-3t} \sin 2t)\, e^{-j\omega t}\, dt$$

$$= \int (\sin 2t)\, e^{t(-3-j\omega)}$$

$$= \frac{1/2j}{3-2j+j\omega} - \frac{1/2j}{3+2j-j\omega}$$

$$X(j\omega) = \frac{2}{(3+2j)^2 + 2^2} = \frac{2}{4+9+4j-4} = \frac{2}{9+4j}$$