

① e) Simol 1) $x(t) = u(t+6) - u(t+2) + 3(u(t+2) - u(t-2)) - u(t-2) + u(t-4)$

$$x(t) = \text{ret}\left(\frac{t+4}{4} + \frac{1}{1}\right) + 3\text{ret}\left(\frac{t}{4}\right) - \text{ret}\left(\frac{t+3}{2}\right)$$

$$X(j\omega) = 4 \text{sinc}(2\omega) \cdot e^{j\omega 4} + 12 \text{sinc}(2\omega) - 2 \text{sinc}(\omega) \cdot e^{-j\omega 3}$$

||

Simol 2) $x(t) = 2 \text{sim}(2\pi t)$

$$1 \leftrightarrow 2\pi \delta(\omega)$$

$$x(t) e^{j\omega_0 t} \leftrightarrow X(\omega - \omega_0)$$

$$e^{j\omega_0 t} \leftrightarrow 2\pi \delta(\omega - \omega_0)$$

$$X(j\omega) = \sum_{k=-\infty}^{\infty} 2\pi \omega_k \delta(\omega - \omega_0)$$

$$x(t) = 2 \cdot \left(\frac{e^{j2\pi t} - e^{-j2\pi t}}{j2} \right) \cdot \text{ret}\left(\frac{t}{4}\right)$$

$$X(j\omega) = \left(\underbrace{2\pi \delta(\omega - 2\pi) - 2\pi \delta(\omega + 2\pi)}_0 \right) * \overset{\text{convolução}}{\frac{1}{2\pi} \cdot 4 \text{sinc}(2\omega)}$$

$$X(j\omega) = 4 \left(\text{sinc}(2 \cdot (\omega - 2\pi)) - \text{sinc}(2 \cdot (\omega + 2\pi)) \right)$$

$$\text{Simol 3) } y(t) = 2 \sin(2\pi t) \cdot (u(t) \cdot u(t+4))$$

$$1 \longleftrightarrow 2\pi \delta(\omega)$$

$$e^{j\omega_0 t} \longleftrightarrow 2\pi \delta(\omega - \omega_0)$$

$$X(j\omega) = \sum_{k=-\infty}^{\infty} 2\pi a_k \delta(\omega - \omega_0)$$

$$x(t) = 2 \left(\frac{e^{-j2\pi t} - e^{-j2\pi(t+4)}}{j2} \right) \cdot \text{rect} \left(\frac{t+4}{4} \right)$$

$$X(j\omega) = 1 \cdot \left(\frac{2\pi \delta(\omega - 2\pi) - 2\pi \delta(\omega + 2\pi)}{j} \right) * \frac{1}{2\pi} \left(4 \text{sinc}(2\omega) \cdot (e^{j2\omega}) \right)$$

$$X(j\omega) = 4 \left(\frac{\text{sinc}(2(\omega - 2\pi)) - \text{sinc}(2(\omega + 2\pi))}{j} \right) \cdot e^{j2\omega}$$