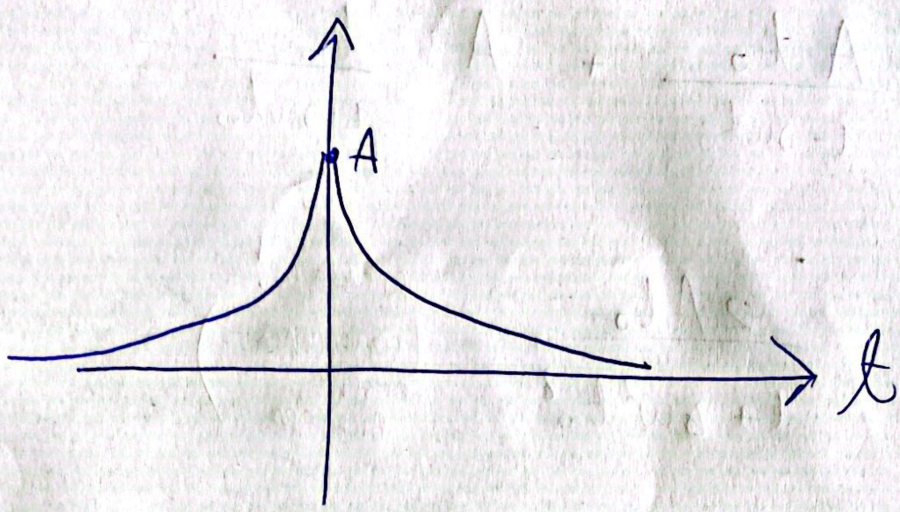
ES 3



$$x(t) = A\, e^{-\frac{|t|}{t_0}} \qquad \boxed{t_0 > 0}$$

$$X(\omega) = \int_{-\infty}^{+\infty} x(t)\, e^{-j\omega t}\, dt$$ ANALISI SEGNALI APERIODICI

$$= \int_{-\infty}^{0} A\, e^{t/t_0}\, e^{-j\omega t}\, dt + \int_{0}^{+\infty} A\, e^{-t/t_0}\, e^{-j\omega t}\, dt$$

$$= A\int_{-\infty}^{0} e^{t\left(\frac{1}{t_0} - j\omega\right)}\, dt + A\int_{0}^{+\infty} e^{t\left(-\frac{1}{t_0} - j\omega\right)}\, dt$$

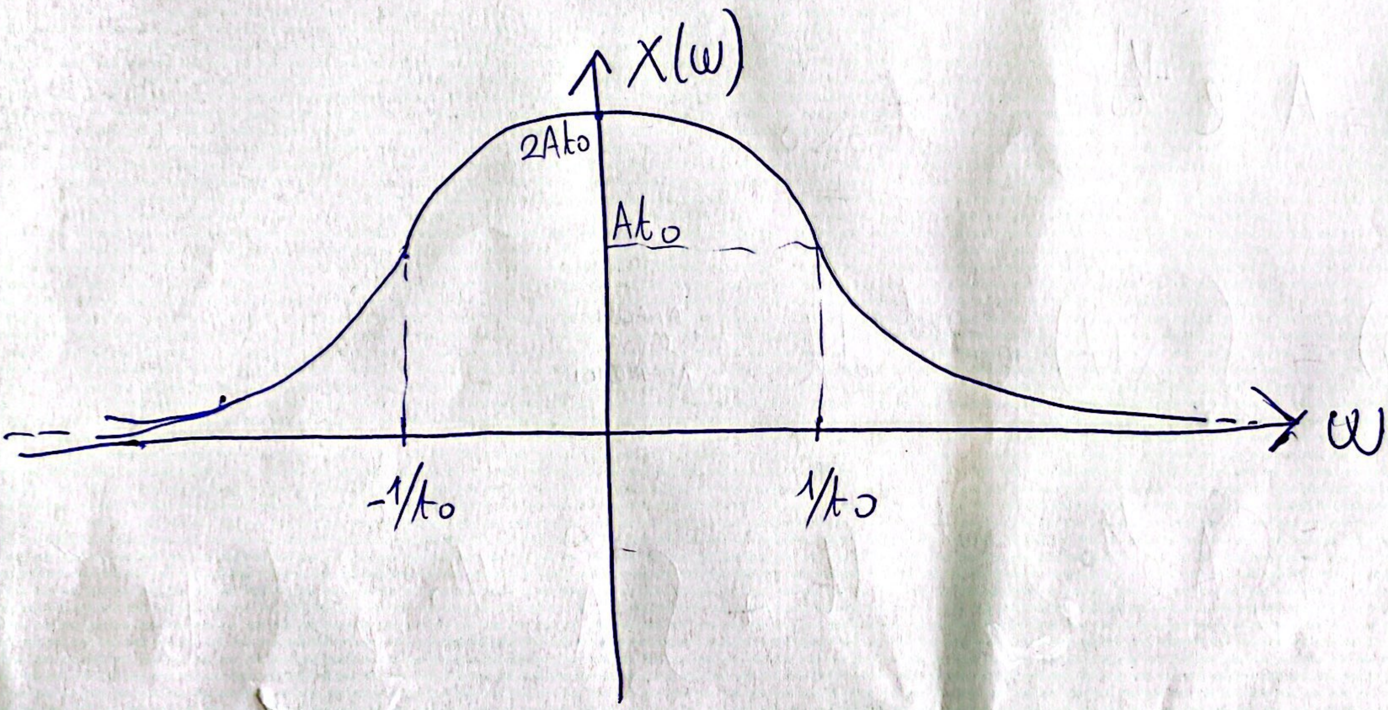
$$= A \cdot \left[\frac{e^{t(1/t_0 - j\omega)}}{\underbrace{\frac{1}{t_0}}_{t_0 > 0 \text{ PER DEF.}} - j\omega} \right]_{-\infty}^{0} + A \cdot \left[\frac{e^{t\left(-\frac{1}{t_0} - j\omega\right)}}{-\frac{1}{t_0} - j\omega} \right]_{0}^{+\infty}$$

$$= A \cdot \frac{1}{\frac{1}{t_0} - j\omega} + A \cdot \frac{1}{\frac{1}{t_0} - j\omega}$$

$$= \frac{A t_0}{1 - j\omega t_0} + A \frac{t_0}{1 + j\omega t_0} =$$

$$= \boxed{\frac{2 A t_0}{1 + \cancel{j}\omega^2 t_0^2}}$$

RISULTATO!
(TRASFORMATA CUSPIDE BILATERA)



NOTA: t_0 + PICCOLO → CAMPANA + LARGA