Ejercicios

1) $\tilde{x}(t) = 7te^{-3t}$ $\quad T_s \in R^+$

Discreta? $\quad n \in Z$

$\tilde{x}[t = nT_s] = ?$

$$\sum_{n\in Z} \int_{nT_s} \tilde{x}(t)\, \delta(t - nT_s)\, dt$$

$$\tilde{x}(t) = 7te^{-3t}$$

$$x[n] = x(nT_s) = 7(nT_s)e^{-3(nT_s)}$$

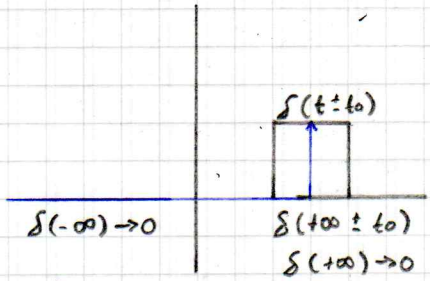
Por tanto

$\tilde{x}(t) = 7te^{-3t}$ de forma discreta

$$\sum_{n\in Z} 7(nT_s)e^{-3(nT_s)}\, \delta(t - nT_s)$$

2) Demostrar

$$\int_{-\infty}^{\infty} \frac{d}{dt}\delta(t) \cdot x(t)\, dt = -\frac{dx(t)}{dt}\Big|_{t=0}$$



$$\frac{dF(t)}{dt} = \lim_{\Delta t \to 0} \frac{F(t) - F(t - \Delta t)}{\Delta t}$$

$u = x(t)$

$du = \frac{d}{dt} x(t)\, dt$

$$v = \int_{-\infty}^{\infty} \frac{d}{dt}\, \delta(t \pm t_0)\, dt$$

$v = \delta(t \pm t_0)$

$x(t)\, \delta(t \pm t_0)$

$$\int \delta(t \pm t_0) \frac{dx(t)}{dt} dt \Big|_{-\infty}^{\infty}$$

$$x(t)\,\delta(t \pm t_0) - \tilde{x}(\mp t_0) \Big|_{-\infty}^{\infty}$$

$$x(+\infty)\,\delta(+\infty \pm t_0) - x(-\infty)\,\delta(-\infty \pm t_0) = \infty\,\tilde{x}(\mp t_0)$$

$$-\tilde{x}(\mp t_0) = -\frac{dx(t)}{dt}\Big|_{t=0}$$