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Formulas Mate 5

Integrales delta de Dirac

Sea f continua a trozos, continua en t_0

$$\int_{-\infty}^{\infty} \delta(t-t_0)f(t)dt = f(t_0)$$

$$\int_{-\infty}^{\infty} \delta^{(n)}(t-t_0)f(t)dt = (-1)^n \int_{-\infty}^{\infty} \delta(t-t_0)f^{(n)}(t)dt$$

$$\int_{a}^{b} \delta(t-t_0)f(t)dt = \begin{cases} f(t_o), & a < t_0 < b \\ 0 & t_0 < a \vee t_0 > b \\ ?? & sino \end{cases}$$

Fourier

Serie trigonometrica

Sea $X(t)$ periodica de periodo T, frecuencia f_0

$$w_n = 2\pi f_0 n = w_0 n$$

$$x(t) \sim a_0 + \sum_{n=1}^{\infty} a_n cos(w_n t) + b_n sin(w_n t)$$

Donde

$$\begin{cases} a_0 = 1/T \int_{t_0}^{t_0+T} x(t)dt \\ a_n = 2/T \int_{t_0}^{t_0+T} x(t)cos(w_n t)dt \\ b_n = 2/T \int_{t_0}^{t_0+T} x(t)sin(w_n t)dt \end{cases}$$

Parseval

$$2|a_0|^2 + \sum_{n=1}^{\infty} |a_n|^2 + |b_n|^2 = \frac{2}{T} \int_{t_0}^{t_0+T} |x(t)|^2 dt$$

Serie exponencial

$$x(t) \sim \sum_{n=-\infty}^{\infty} X_k e^{iw_n t}$$

Parseval

$$\sum_{k=-\infty}^{\infty} |X_k|^2 = \frac{1}{T} \int_{to}^{to+T} |x(t)|^2 dt$$

Formula util

$$c_j = \frac{\langle v, \phi_j \rangle}{||\phi_j||^2}$$