DEPARTAMENTO DE MATEMÁTICAS AVANZADAS

FORMULARIO DE MATEMÁTICAS AVANZADAS

TRANSFORMADA DE FOURIER

$$F(\omega) = \mathscr{F}\{f(t)\} = \int_{-\infty}^{\infty} f(t)\, e^{-i\omega t}\, dt$$

$f(t)$	$F(\omega)$
$u(t)\, e^{-at}\ ,\ a>0$	$\dfrac{1}{a+i\omega}$
$k\left[u(t+a)-u(t-a)\right]$	$\dfrac{2k}{\omega}\operatorname{sen}(a\omega)$
$e^{-a\lvert t\rvert}\ ,\ a>0$	$\dfrac{2a}{a^2+\omega^2}$
$e^{-at^2}\ ,\ a>0$	$\sqrt{\dfrac{\pi}{a}}\ e^{-\omega^2/4a}$
$\dfrac{1}{a^2+t^2}$	$\dfrac{\pi}{a}\ e^{-a\lvert\omega\rvert}$
$\delta(t)$	1
$t\, e^{-at^2}\ ,\ a>0$	$-\dfrac{i\omega}{2a}\sqrt{\dfrac{\pi}{a}}\ e^{-\omega^2/4a}$
$\dfrac{t}{a^2+t^2}$	$-\dfrac{\pi}{a}\, i\omega\ e^{-a\omega}$
$e^{-i\omega_0 t}$	$2\pi\delta(\omega-\omega_0)$
$\cos(\omega_0 t)$	$\pi\left[\delta(\omega+\omega_0)+\delta(\omega-\omega_0)\right]$
$\operatorname{sen}(\omega_0 t)$	$\pi i\left[\delta(\omega+\omega_0)-\delta(\omega-\omega_0)\right]$
$\dfrac{1}{a+it}$	$2\pi u(-\omega)\, e^{a\omega}$

PROPIEDADES DE LA TRANSFORMADA DE FOURIER

$$F(\omega) = \mathscr{F}\{f(t)\} = \int_{-\infty}^{\infty} f(t)\, e^{-i\omega t}\, dt$$

$f(t)$	$F(\omega)$
$a\,f(t) + b\,g(t)$	$a\,F(\omega) + b\,G(\omega)$
$f(t - t_0)$	$e^{-i\omega t_0} F(\omega)$
$e^{i\omega_0 t} f(t)$	$F(\omega - \omega_0)$
$f(at)$	$\frac{1}{\vert a \vert} F\left(\frac{\omega}{a}\right)$
$f(-t)$	$F(-\omega)$
$F(t)$	$2\pi f(-\omega)$
$f(t)\cos(\omega_0 t)$	$\frac{1}{2}\left[F(\omega + \omega_0) + F(\omega - \omega_0)\right]$
$f(t)\,\mathrm{sen}(\omega_0 t)$	$\frac{i}{2}\left[F(\omega + \omega_0) - F(\omega - \omega_0)\right]$
$f^{(n)}(t) \;,\; n \in \mathbb{N}$	$(i\omega)^n F(\omega)$
$t^n f(t) \;,\; n \in \mathbb{N}$	$i^n F^n(\omega)$
$\int_{-\infty}^{\tau} f(\tau)\, d\tau$	$\frac{1}{i\omega} F(\omega)$
$(f * g)(t)$	$F(\omega)\, G(\omega)$
$f(t)\, g(t)$	$\frac{1}{2\pi}(F * G)(\omega)$

FORMULARIO DE MATEMÁTICAS AVANZADAS

$$\text{sen}(z) = z - \frac{z^3}{3!} + \frac{z^5}{5!} - \cdots$$

$$\cos(z) = 1 - \frac{z^2}{2!} + \frac{z^4}{4!} - \cdots$$

$$\int t\,\text{sen}(at)\,dt = \frac{\text{sen}(at)}{a^2} - \frac{t\cos(at)}{a} + C$$

$$\int t^2\,\text{sen}(at)\,dt = \frac{2t}{a^2}\,\text{sen}(at) + \left(\frac{2}{a^3} - \frac{t^2}{a}\right)\cos(at) + C$$

$$\int t\cos(at)\,dt = \frac{\cos(at)}{a^2} + \frac{t\,\text{sen}(at)}{a} + C$$

$$\int t^2\cos(at)\,dt = \frac{2t}{a^2}\cos(at) + \left(\frac{t^2}{a} - \frac{2}{a^3}\right)\text{sen}(at) + C$$

$$\int e^{-t}\,\text{sen}(at)\,dt = \frac{e^{-t}\left(a\,\text{sen}(at) - \cos(at)\right)}{a^2+1} + C$$

$$\int e^{-t}\cos(at)\,dt = \frac{e^{-t}\left(-\text{sen}(at) - a\cos(at)\right)}{a^2+1} + C$$

$$\int e^{at}\,\text{sen}(bt)\,dt = \frac{e^{at}}{a^2+b^2}\left[a\,\text{sen}(bt) - b\cos(bt)\right] + C$$

$$\int e^{at}\cos(bt)\,dt = \frac{e^{at}}{a^2+b^2}\left[a\cos(bt) + b\,\text{sen}(bt)\right] + C$$