TRANSFORMADAS DE FOURIER

	$f(x)$	$f(\omega)=\Im[f(x)]$
1	$e^{-a^2x^2}$	$\dfrac{\sqrt{\pi}}{a}\,e^{\frac{-\omega^2}{4a^2}}$
2	$e^{-a\lvert x\rvert},\quad a>0$	$\dfrac{2a}{a^2+\omega^2}$
3	$\begin{cases}1 & \lvert x\rvert<a \\ & ,a>0 \\ 0 & \lvert x\rvert>a\end{cases}$	$\dfrac{2\,\text{sen}\,a\,\omega}{\omega}$
4	$\dfrac{1}{x^2+a^2},\quad \text{Re}\,a<0$	$\dfrac{-\pi}{a}\,e^{a\lvert\omega\rvert}$
5	$\dfrac{x}{\left(x^2+a^2\right)^2},\quad \text{Re}\,a<0$	$\dfrac{i\omega\pi}{2a}\,e^{a\lvert\omega\rvert}$
6	$x\,e^{-a\lvert x\rvert},\quad a>0$	$-4\dfrac{i\,a\,\omega}{\left(a^2+\omega^2\right)^2}$
7	$\begin{cases}\cos ax\,, & \lvert x\rvert<\dfrac{\pi}{2a} \\ 0 & ,\lvert x\rvert>\dfrac{\pi}{2a}\end{cases}$	$\dfrac{2a}{a^2-\omega^2}\cos\dfrac{\pi\omega}{2a}$
8	$\begin{cases}1-\lvert x\rvert & ,\quad \lvert x\rvert<1 \\ 0 & ,\quad \lvert x\rvert>1\end{cases}$	$4\dfrac{\text{sen}^2\,\dfrac{\omega}{2}}{\omega^2}$
9	$\begin{Bmatrix}0 & , & x<0 \\ x^k e^{ax}, & & x>0\end{Bmatrix}\quad \begin{matrix}\text{Re}\,a<0 \\ k=1,2,\ldots\end{matrix}$	$\dfrac{k!}{(i\omega-a)^{k+1}}$
10	$\begin{Bmatrix}-x^k e^{ax}, & x<0 \\ 0 \quad , & x>0\end{Bmatrix}\quad \begin{matrix}\text{Re}\,a>0 \\ k=1,2,\ldots\end{matrix}$	$\dfrac{k!}{(i\omega-a)^{k+1}}$
11	$\delta(t-c)$	$e^{-ic\omega}$
12	$\delta^{(n)}(t-c)$	$(i\omega)^n\,e^{-ic\omega}$
13	1	$2\pi\,\delta(\omega)$
14	t^n	$2\pi\,i^n\delta^{(n)}(\omega)$
15	e^{iat}	$2\pi\delta(\omega-a)$
16	$t^n e^{iat}$	$2\pi\,i^n\,\delta^{(n)}(\omega-a)$

17	$U(t-c)$	$\frac{e^{-ic\omega}}{i\omega}+\pi\delta(\omega)$
18	$t^nU(t)$	$\frac{n!}{(i\,\omega)^{n+1}}+\pi\ i^n\ \delta^{(n)}\ (\omega)$
19	$\frac{1}{(t-c)^n}$	$\frac{(-i\,\omega)^{n-1}e^{-ic\omega}}{(n-1)!}\pi\ i\left[1-2U(\omega)\right]$
20	$e^{iat}t^nU(t)$	$\frac{n!}{\left[i(\omega-a)\right]^{n+1}}+\pi\ i^n\delta^{(n)}(\omega-a)$
21	$\frac{e^{iat}}{t-c}$	$e^{-ic(\omega-a)}\ \pi\ i\left[1-2U(\omega-a)\right]$

Representación integral de $f(x)$:

$$f(x)=\int_0^{\infty}(a(w).\cos wx+b(w).\operatorname{sen} wx)\,dw \qquad \begin{cases} a(w)=\frac{1}{\pi}\int_{-\infty}^{+\infty}f(u)\cos wu\,du \\ b(w)=\frac{1}{\pi}\int_{-\infty}^{+\infty}f(u)\operatorname{sen} wu\,du \end{cases}$$

$$f(x)=\frac{1}{2\pi}\int_{-\infty}^{+\infty}e^{iwx}\left(\int_{-\infty}^{+\infty}f(u).e^{-iwu}du\right)dw$$

TRANSFORMADA DE FOURIER:

$$F(w)=\int_{-\infty}^{\infty}f(x)e^{-iwx}dx=\mathcal{F}[f(x)] \qquad f(x)=\frac{1}{2\pi}\int_{-\infty}^{+\infty}F(w).e^{iwx}dw$$

$$\left.\begin{array}{l} \mathcal{F}[\alpha f(x)+\beta g(x)]=\alpha\mathcal{F}[f(x)]+\beta\mathcal{F}[g(x)] \\ \mathcal{F}[f(x-h)]=e^{-iwh}.\mathcal{F}[f(x)] \\ \mathcal{F}[e^{ihx}.f(x)]=F(w-h) \\ \mathcal{F}[f'(x)]=(iw)\mathcal{F}[f(x)] \longrightarrow \mathcal{F}[f^{k)}(x)]=(iw)^k\mathcal{F}[f(x)] \\ \mathcal{F}[f_1(x)*f_2(x)]=\mathcal{F}[f_1(x)].\mathcal{F}[g(x)] \quad \text{(Convolución)} \end{array}\right\}\text{Propiedades}$$

$$\mathcal{F}[\delta(t-c)]=e^{-iwc}$$

$$\mathcal{F}[\delta^{n)}(t-c)]=(iw)^ne^{-iwc}$$

$$\delta^{n)}(t-c)*f(t)=f^{n)}(t-c)$$

$$\delta^{n_1)}(t-c_1)*\delta^{n_2)}(t-c_2)=\delta^{(n_1+n_2)}(t-c_1-c_2)$$

Si $\mathcal{F}[f(t)]=F(w) \Rightarrow$

$$\mathcal{F}[F(t)]=2\pi f(-w)$$

$$\mathcal{F}[e^{-at}u(t)]=\frac{1}{iw+a} \qquad a>0$$

$$\mathcal{F}[e^{at}u(t)]=\frac{-1}{iw-a} \qquad a>0$$