PROPIEDADES DE LA TRANSFORMADA DE FOURIER

E

APENDICE

Las funciones son periódicas con período T, $a > 0$; b, t_o y $\omega_o = 2\pi/T$, son constantes reales, con $n = 1, 2, \cdots$.

$f(t)$	$F(\omega)$
$a_1 f_1(t) + a_2 f_2(t)$	$a_1 F_1(\omega) + a_2 F_2(\omega)$
$f(at)$	$\frac{1}{\lvert a\rvert} F\left(\frac{\omega}{a}\right)$
$f(-t)$	$F(-\omega)$
$f(t - t_0)$	$F(\omega)\, e^{-j\omega t_0}$
$f(t)\, e^{j\omega_0 t}$	$F(\omega - \omega_0)$
$f(t) \cos \omega_0 t$	$\frac{1}{2} F(\omega - \omega_0) + \frac{1}{2} F(\omega + \omega_0)$
$f(t) \operatorname{sen} \omega_0 t$	$\frac{1}{2j} F(\omega - \omega_0) - \frac{1}{2j} F(\omega + \omega_0)$
$f_e(t) = \frac{1}{2} [f(t) + f(-t)]$	$R(\omega)$
$f_o(t) = \frac{1}{2} [f(t) - f(-t)]$	$jX(\omega)$
$f(t) = f_e(t) + f_o(t)$	$F(\omega) = R(\omega) + jX(\omega)$
$F(t)$	$2\pi f(-\omega)$
$f'(t)$	$j\omega F(\omega)$
$f^{(n)}(t)$	$(j\omega)^n F(\omega)$
$\int_{-\infty}^{t} f(x)\, dx$	$\frac{1}{j\omega} F(\omega) + \pi F(0)\, \delta(\omega)$
$-jt\, f(t)$	$F'(\omega)$
$(-jt)^n f(t)$	$F^{(n)}(\omega)$
$f_1(t) * f_2(t) = \int_{-\infty}^{\infty} f_1(x)\, f_2(t - x)\, dx$	$F_1(\omega)\, F_2(\omega)$

$f(t)$	$F(\omega)$
$f_1(t)\, f_2(t)$	$\dfrac{1}{2\pi} F_1(\omega) * F_2(\omega) = \dfrac{1}{2\pi}\displaystyle\int_{-\infty}^{\infty} F_1(y) F_2(\omega - y)\, dy$
$e^{-at} u(t)$	$\dfrac{1}{j\omega + a}$
$e^{-a\lvert t\rvert}$	$\dfrac{2a}{a^2 + \omega^2}$
e^{-at^2}	$\sqrt{\dfrac{\pi}{a}}\, e^{-\omega^2/(4a)}$
$p_a(t) = \begin{cases} 1 & \text{para } \lvert t\rvert < a/2 \\ 0 & \text{para } \lvert t\rvert > a/2 \end{cases}$	$a\,\dfrac{\operatorname{sen}\left(\dfrac{\omega a}{2}\right)}{\left(\dfrac{\omega a}{2}\right)}$
$\dfrac{\operatorname{sen} at}{\pi t}$	$p_{2a}(\omega)$
$te^{-at} u(t)$	$\dfrac{1}{(j\omega + a)^2}$
$\dfrac{t^{n-1}}{(n-1)!}\, e^{-at} u(t)$	$\dfrac{1}{(j\omega + a)^n}$
$e^{-at} \operatorname{sen} bt\, u(t)$	$\dfrac{b}{(j\omega + a)^2 + b^2}$
$e^{-at} \cos bt\, u(t)$	$\dfrac{j\omega + a}{(j\omega + a)^2 + b^2}$
$\dfrac{1}{a^2 + t^2}$	$\dfrac{\pi}{a}\, e^{-a\lvert\omega\rvert}$
$\dfrac{\cos bt}{a^2 + t^2}$	$\dfrac{\pi}{2a}\left[e^{-a\lvert\omega - b\rvert} + e^{-a\lvert\omega + b\rvert}\right]$
$\dfrac{\operatorname{sen} bt}{a^2 + b^2}$	$\dfrac{\pi}{2aj}\left[e^{-a\lvert\omega - b\rvert} - e^{-a\lvert\omega + b\rvert}\right]$
$\delta(t)$	1
$\delta(t - t_0)$	$e^{-j\omega t_0}$
$\delta'(t)$	$j\omega$
$\delta^{(n)}(t)$	$(j\omega)^n$
$u(t)$	$\pi\delta(\omega) + \dfrac{1}{j\omega}$
$u(t - t_0)$	$\pi\delta(\omega) + \dfrac{1}{j\omega}\, e^{-j\omega t_0}$
1	$2\pi\delta(\omega)$
t	$2\pi j\, \delta'(\omega)$
t^n	$2\pi j^n \delta^{(n)}(\omega)$

$f(t)$	$F(\omega)$
$e^{j\omega_0 t}$	$2\pi\delta(\omega-\omega_0)$
$\cos\omega_0 t$	$\pi[\delta(\omega-\omega_0)+\delta(\omega+\omega_0)]$
$\operatorname{sen}\omega_0 t$	$-j\pi[\delta(\omega-\omega_0)-\delta(\omega+\omega_0)]$
$\operatorname{sen}\omega_0 t\, u(t)$	$\dfrac{\omega_0}{\omega_0^2-\omega^2}+\dfrac{\pi}{2j}[\delta(\omega-\omega_0)-\delta(\omega+\omega_0)]$
$\cos\omega_0 t\, u(t)$	$\dfrac{j\omega}{\omega_0^2-\omega^2}+\dfrac{\pi}{2}[\delta(\omega-\omega_0)+\delta(\omega+\omega_0)]$
$t\,u(t)$	$j\pi\,\delta'(\omega)-\dfrac{1}{\omega^2}$
$\dfrac{1}{t}$	$\pi j-2\pi j\,u(\omega)$
$\dfrac{1}{t^n}$	$\dfrac{(-j\omega)^{n-1}}{(n-1)!}[\pi j-2\pi j\,u(\omega)]$
$\operatorname{sgn} t$	$\dfrac{2}{j\omega}$
$\delta_T(t)=\sum_{n=-\infty}^{\infty}\delta(t-nT)$	$\omega_0\delta_{\omega_0}(\omega)=\omega_0\sum_{n=-\infty}^{\infty}\delta(\omega-n\omega_0)$

Otras propiedades:

$$\int_{-\infty}^{\infty} f_1(t)\,f_2(t)\,dt=\frac{1}{2\pi}\int_{-\infty}^{\infty} F_1(\omega)\,F_2^*(\omega)\,d\omega,$$

$$\int_{-\infty}^{\infty} |f(t)|^2\,dt=\frac{1}{2\pi}\int_{-\infty}^{\infty} |F(\omega)|^2\,d\omega,$$

$$\int_{-\infty}^{\infty} f(x)\,G(x)\,dx=\int_{-\infty}^{\infty} F(x)\,g(x)\,dx.$$

TABLA 18.1 Transformadas finitas de Fourier en senos

$f(x)$	$S_n\{f(x)\} = F_S(n)$
$\dfrac{\pi - x}{\pi}$	$\dfrac{1}{n}$
$\dfrac{x}{\pi}$	$\dfrac{(-1)^{n+1}}{n}$
1	$\dfrac{1-(-1)^n}{n}$
$\dfrac{x(\pi^2 - x^2)}{6}$	$\dfrac{(-1)^{n+1}}{n^3}$
$\dfrac{x(\pi - x)}{2}$	$\dfrac{1-(-1)^n}{n^3}$
x^2	$\dfrac{\pi^2(-1)^{n+1}}{n} - \dfrac{2[1-(-1)^n]}{n^3}$
x^3	$\pi(-1)^n\left(\dfrac{6}{n^3} - \dfrac{\pi^2}{n}\right)$
e^{ax}	$\dfrac{n}{n^2 + a^2}[1 - (-1)^n e^{an}]$
$\operatorname{sen}(kx)$, $\quad k = 1, 2, 3, \ldots$	$\begin{cases} 0 & \text{si } n \neq k \\ \pi/2 & \text{si } n = k \end{cases}$
$\cos(ax)$, $\quad a \neq$ entero	$\dfrac{n}{n^2 - a^2}[1 - (-1)^n \cos(a\pi)]$
$\cos(kx)$, $\quad k = 1, 2, 3, \ldots$	$\begin{cases} \dfrac{n}{n^2 - a^2}[1 - (-1)^{n+k}], & n \neq k \\ \dfrac{\pi}{2}, & n = k \end{cases}$

TABLA 18.1 Transformadas finitas de Fourier en senos

$f(x)$		$S_n\{f(x)\} = F_S(n)$
$\dfrac{\pi - x}{\pi}$		$\dfrac{1}{n}$
$\dfrac{x}{\pi}$		$\dfrac{(-1)^{n+1}}{n}$
1		$\dfrac{1-(-1)^n}{n}$
$\dfrac{x(\pi^2 - x^2)}{6}$		$\dfrac{(-1)^{n+1}}{n^3}$
$\dfrac{x(\pi - x)}{2}$		$\dfrac{1-(-1)^n}{n^3}$
x^2		$\dfrac{\pi^2(-1)^{n+1}}{n} - \dfrac{2[1-(-1)^n]}{n^3}$
x^3		$\pi(-1)^n\left(\dfrac{6}{n^3} - \dfrac{\pi^2}{n}\right)$
e^{ax}		$\dfrac{n}{n^2 + a^2}[1 - (-1)^n e^{an}]$
$\operatorname{sen}(kx)$,	$k = 1, 2, 3, \ldots$	$\begin{cases} 0 & \text{si } n \neq k \\ \pi/2 & \text{si } n = k \end{cases}$
$\cos(ax)$,	$a \neq$ entero	$\dfrac{n}{n^2 - a^2}[1 - (-1)^n \cos(a\pi)]$
$\cos(kx)$,	$k = 1, 2, 3, \ldots$	$\begin{cases} \dfrac{n}{n^2 - a^2}[1 - (-1)^{n+k}], & n \neq k \\ \dfrac{\pi}{2}, & n = k \end{cases}$

TABLA 18.2 Transformadas finitas de Fourier en cosenos

$f(x)$	$C_n\{f(x)\} = F_C(n)$
1	$\begin{cases} 0 & \text{si } n = 1, 2, 3, \ldots \\ \pi & \text{si } n = 0 \end{cases}$
$\begin{cases} 1, & \text{si } 0 \le x \le k \\ -1, & \text{si } k < x < \pi \end{cases}$	$\begin{cases} \dfrac{2}{n}\operatorname{sen}(nk) & \text{si } n = 1, 2, 3, \ldots \\ 2k - \pi & \text{si } n = 0 \end{cases}$
x	$\begin{cases} \dfrac{-[1 - (-1)^n]}{n^2} & \text{si } n = 1, 2, 3, \ldots \\ \dfrac{\pi^2}{2} & \text{si } n = 0 \end{cases}$
$\dfrac{x^2}{2\pi}$	$\begin{cases} \dfrac{(-1)^n}{n} & \text{si } n = 1, 2, 3, \ldots \\ \dfrac{\pi^2}{6} & \text{si } n = 0 \end{cases}$
x^3	$\begin{cases} 3\pi^2 \dfrac{(-1)^n}{n^2} + 6\dfrac{[1 - (-1)^n]}{n^4} & \text{si } n = 1, 2, 3, \ldots \\ \dfrac{\pi^2}{4} & \text{si } n = 0 \end{cases}$
e^{ax}	$\left(\dfrac{(-1)^n e^{a\pi} - 1}{n^2 + a^2}\right)a$
$\operatorname{sen}(ax)$, $a \neq$ entero	$\left(\dfrac{(-1)^n \cos(a\pi) - 1}{n^2 - a^2}\right)a$
$\operatorname{sen}(kx)$, $k = 1, 2, \ldots$	$\begin{cases} \dfrac{(-1)^{n+k} - 1}{n^2 - k^2}k & \text{si } n \neq k \\ 0 & \text{si } n = k \end{cases}$
$\cos(kx)$, $k = 1, 2, 3, \ldots$	$\begin{cases} 0 & \text{si } n \neq k \\ \dfrac{\pi}{2} & \text{si } n = k \end{cases}$
$f(\pi - x)$	$(-1)^n F_C(n)$
$\dfrac{1}{\pi}\dfrac{1 - k^2}{1 + k^2 - 2k\cos(x)}$	$k^n \quad (\lvert k \rvert < 1)$
$-\dfrac{1}{\pi}\ln[1 + k^2 - 2k\cos(x)]$	$\dfrac{1}{n}k^n \quad (\lvert k \rvert < 1)$
$\dfrac{\cosh[k(\pi - x)]}{k\operatorname{senh}(k\pi)}$	$\dfrac{1}{k^2 + n^2} \quad (k \neq 0)$
$\dfrac{1}{\pi}\dfrac{\operatorname{senh}(y)}{\cosh(y) - \cos(x)}$	$e^{-ny} \quad (y > 0)$
$\dfrac{1}{\pi}[y - \ln(2\cosh(y) - 2\cos(x))]$	$\dfrac{1}{n}e^{-ny} \quad (y > 0)$

TABLA 18.4 Transformadas de Fourier en cosenos

$f(x)$	$\mathscr{F}_C\{f(x)\} = F_C(\omega)$
$x^{r-1} \quad (0 < r < 1)$	$\Gamma(r)\cos\left(\dfrac{\pi r}{2}\right)\omega^{-r}$
$e^{-ax} \quad (a > 0)$	$\dfrac{a}{a^2 + \omega^2}$
$xe^{-ax} \quad (a > 0)$	$\dfrac{a^2 - \omega^2}{(a^2 + \omega^2)^2}$
$e^{-a^2x^2} \quad (a > 0)$	$\dfrac{\sqrt{\pi}}{2} a^{-1}\omega e^{-\omega^2/4a^2}$
$\dfrac{1}{a^2 + x^2} \quad (a > 0)$	$\dfrac{\pi}{2}\dfrac{1}{a} e^{-a\omega}$
$\dfrac{1}{(a^2 + x^2)^2} \quad (a > 0)$	$\dfrac{\pi}{4} a^{-3}e^{-a\omega}(1 + a\omega)$
$\cos\left(\dfrac{x^2}{2}\right)$	$\dfrac{\sqrt{\pi}}{2}\left[\cos\left(\dfrac{\omega^2}{2}\right) + \operatorname{sen}\left(\dfrac{\omega^2}{2}\right)\right]$
$\operatorname{sen}\left(\dfrac{x^2}{2}\right)$	$\dfrac{\sqrt{\pi}}{2}\left[\cos\left(\dfrac{\omega^2}{2}\right) - \operatorname{sen}\left(\dfrac{\omega^2}{2}\right)\right]$
$\dfrac{1}{2}(1 + x)e^{-x}$	$\dfrac{1}{(1 + \omega^2)^2}$
$\sqrt{\dfrac{2}{\pi x}}$	$\dfrac{1}{\sqrt{\omega}}$
$e^{-x/\sqrt{2}}\operatorname{sen}\left(\dfrac{\pi}{4} + \dfrac{x}{\sqrt{2}}\right)$	$\dfrac{1}{1 + \omega^2}$
$e^{-x/\sqrt{2}}\cos\left(\dfrac{\pi}{4} + \dfrac{x}{\sqrt{2}}\right)$	$\dfrac{\omega^2}{1 + \omega^4}$
$\dfrac{2}{x} e^{-x}\operatorname{sen}(x)$	$\tan^{-1}\left(\dfrac{2}{\omega^2}\right)$
$H(x) - H(x - a)$	$\dfrac{1}{\omega}\operatorname{sen}(a\omega)$

TABLA 18.2 Transformadas finitas de Fourier en cosenos

$f(x)$	$C_n\{f(x)\} = F_C(n)$
1	$\begin{cases} 0 & \text{si } n = 1, 2, 3, \ldots \\ \pi & \text{si } n = 0 \end{cases}$
$\begin{cases} 1, & \text{si } 0 \le x \le k \\ -1, & \text{si } k < x < \pi \end{cases}$	$\begin{cases} \dfrac{2}{n}\operatorname{sen}(nk) & \text{si } n = 1, 2, 3, \ldots \\ 2k - \pi & \text{si } n = 0 \end{cases}$
x	$\begin{cases} \dfrac{-[1-(-1)^n]}{n^2} & \text{si } n = 1, 2, 3, \ldots \\ \dfrac{\pi^2}{2} & \text{si } n = 0 \end{cases}$
$\dfrac{x^2}{2\pi}$	$\begin{cases} \dfrac{(-1)^n}{n} & \text{si } n = 1, 2, 3, \ldots \\ \dfrac{\pi^2}{6} & \text{si } n = 0 \end{cases}$
x^3	$\begin{cases} 3\pi^2 \dfrac{(-1)^n}{n^2} + 6\dfrac{[1-(-1)^n]}{n^4} & \text{si } n = 1, 2, 3, \ldots \\ \dfrac{\pi^2}{4} & \text{si } n = 0 \end{cases}$
e^{ax}	$\left(\dfrac{(-1)^n e^{a\pi} - 1}{n^2 + a^2}\right)a$
$\operatorname{sen}(ax), \quad a \neq \text{entero}$	$\left(\dfrac{(-1)^n \cos(a\pi) - 1}{n^2 - a^2}\right)a$
$\operatorname{sen}(kx), \quad k = 1, 2, \ldots$	$\begin{cases} \dfrac{(-1)^{n+k} - 1}{n^2 - k^2}k & \text{si } n \neq k \\ 0 & \text{si } n = k \end{cases}$
$\cos(kx), \quad k = 1, 2, 3, \ldots$	$\begin{cases} 0 & \text{si } n \neq k \\ \dfrac{\pi}{2} & \text{si } n = k \end{cases}$
$f(\pi - x)$	$(-1)^n F_C(n)$
$\dfrac{1}{\pi}\dfrac{1-k^2}{1+k^2-2k\cos(x)}$	$k^n \quad (\lvert k\rvert < 1)$
$-\dfrac{1}{\pi}\ln[1 + k^2 - 2k\cos(x)]$	$\dfrac{1}{n}k^n \quad (\lvert k\rvert < 1)$
$\dfrac{\cosh[k(\pi - x)]}{k\operatorname{senh}(k\pi)}$	$\dfrac{1}{k^2+n^2} \quad (k \neq 0)$
$\dfrac{1}{\pi}\dfrac{\operatorname{senh}(y)}{\cosh(y) - \cos(x)}$	$e^{-ny} \quad (y > 0)$
$\dfrac{1}{\pi}[y - \ln(2\cosh(y) - 2\cos(x))]$	$\dfrac{1}{n}e^{-ny} \quad (y > 0)$

TABLA 18.4 Transformadas de Fourier en cosenos

$f(x)$	$\mathscr{F}_C\{f(x)\} = F_C(\omega)$
$x^{r-1} \quad (0 < r < 1)$	$\Gamma(r)\cos\left(\dfrac{\pi r}{2}\right)\omega^{-r}$
$e^{-ax} \quad (a > 0)$	$\dfrac{a}{a^2+\omega^2}$
$xe^{-ax} \quad (a > 0)$	$\dfrac{a^2-\omega^2}{(a^2+\omega^2)^2}$
$e^{-a^2x^2} \quad (a > 0)$	$\dfrac{\sqrt{\pi}}{2}\, a^{-1}\omega e^{-\omega^2/4a^2}$
$\dfrac{1}{a^2+x^2} \quad (a > 0)$	$\dfrac{\pi}{2}\dfrac{1}{a}e^{-a\omega}$
$\dfrac{1}{(a^2+x^2)^2} \quad (a > 0)$	$\dfrac{\pi}{4}a^{-3}e^{-a\omega}(1+a\omega)$
$\cos\left(\dfrac{x^2}{2}\right)$	$\dfrac{\sqrt{\pi}}{2}\left[\cos\left(\dfrac{\omega^2}{2}\right)+\operatorname{sen}\left(\dfrac{\omega^2}{2}\right)\right]$
$\operatorname{sen}\left(\dfrac{x^2}{2}\right)$	$\dfrac{\sqrt{\pi}}{2}\left[\cos\left(\dfrac{\omega^2}{2}\right)-\operatorname{sen}\left(\dfrac{\omega^2}{2}\right)\right]$
$\dfrac{1}{2}(1+x)e^{-x}$	$\dfrac{1}{(1+\omega^2)^2}$
$\sqrt{\dfrac{2}{\pi x}}$	$\dfrac{1}{\sqrt{\omega}}$
$e^{-x/\sqrt{2}}\operatorname{sen}\left(\dfrac{\pi}{4}+\dfrac{x}{\sqrt{2}}\right)$	$\dfrac{1}{1+\omega^2}$
$e^{-x/\sqrt{2}}\cos\left(\dfrac{\pi}{4}+\dfrac{x}{\sqrt{2}}\right)$	$\dfrac{\omega^2}{1+\omega^4}$
$\dfrac{2}{x}e^{-x}\operatorname{sen}(x)$	$\tan^{-1}\left(\dfrac{2}{\omega^2}\right)$
$H(x) - H(x-a)$	$\dfrac{1}{\omega}\operatorname{sen}(a\omega)$

TABLA 4.1 PROPIEDADES DE LA TRANSFORMADA DE FOURIER

Sección	Propiedad	Señal aperiódica	Transformada de Fourier
		$x(t)$ $y(t)$	$X(j\omega)$ $Y(j\omega)$
4.3.1	Linealidad	$ax(t) + by(t)$	$aX(j\omega) + bY(j\omega)$
4.3.2	Desplazamiento de tiempo	$x(t - t_0)$	$e^{-j\omega t_0}X(j\omega)$
4.3.6	Desplazamiento de frecuencia	$e^{j\omega_0 t}x(t)$	$X(j(\omega - \omega_0))$
4.3.3	Conjugación	$x^*(t)$	$X^*(-j\omega)$
4.3.5	Inversión de tiempo	$x(-t)$	$X(-j\omega)$
4.3.5	Escalamiento de tiempo y de frecuencia	$x(at)$	$\frac{1}{\|a\|}X\left(\frac{j\omega}{a}\right)$
4.4	Convolución	$x(t) * y(t)$	$X(j\omega)\,Y(j\omega)$
4.5	Multiplicación	$x(t)y(t)$	$\frac{1}{2\pi}X(j\omega) * Y(j\omega)$
4.3.4	Diferenciación en tiempo	$\frac{d}{dt}x(t)$	$j\omega X(j\omega)$
4.3.4	Integración	$\int_{-\infty}^{t} x(t)dt$	$\frac{1}{j\omega}X(j\omega) + \pi X(0)\delta(\omega)$
4.3.6	Diferenciación en frecuencia	$tx(t)$	$j\frac{d}{d\omega}X(j\omega)$
4.3.3	Simetría conjugada para señales reales	$x(t)$ real	$\begin{cases} X(j\omega) = X^*(-j\omega) \\ \mathcal{R}_e\{X(j\omega)\} = \mathcal{R}_e\{X(-j\omega)\} \\ \mathcal{I}_m\{X(j\omega)\} = -\mathcal{I}_m\{X(-j\omega)\} \\ \|X(j\omega)\| = \|X(-j\omega)\| \\ \sphericalangle X(j\omega) = -\sphericalangle X(-j\omega) \end{cases}$
4.3.3	Simetría para señales real y par	$x(t)$ real y par	$X(j\omega)$ real y par
4.3.3	Simetría para señales real e impar	$x(t)$ real e impar	$X(j\omega)$ puramente imaginaria e impar
4.3.3	Descomposición par-impar de señales reales	$x_e(t) = \mathcal{E}v\{x(t)\}$ $[x(t)$ real$]$ $x_o(t) = \mathcal{O}d\{x(t)\}$ $[x(t)$ real$]$	$\mathcal{R}_e\{X(j\omega)\}$ $j\mathcal{I}_m\{X(j\omega)\}$

4.3.7 Relación de Parseval para señales aperiódicas

$$\int_{-\infty}^{+\infty} |x(t)|^2 dt = \frac{1}{2\pi}\int_{-\infty}^{+\infty} |X(j\omega)|^2 \, d\omega$$

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Tabla 18-1 Algunas parejas familiares de transformada de Fourier

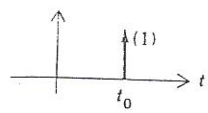
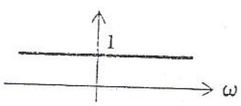
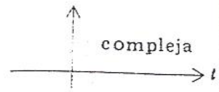
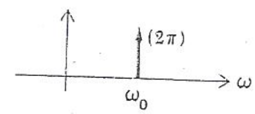
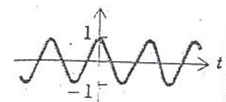
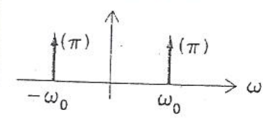
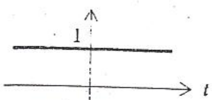
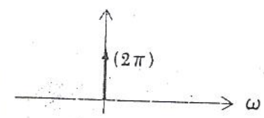
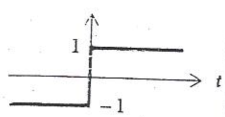
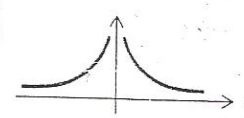
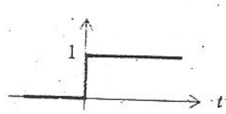
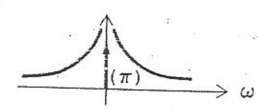
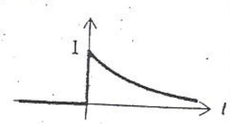
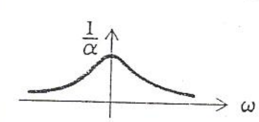
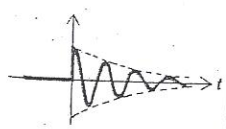
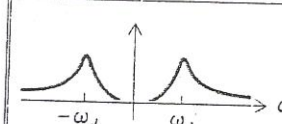
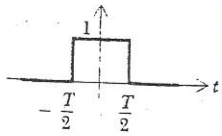
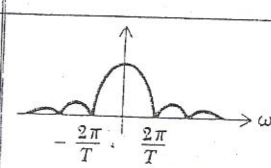
$f(t)$	$f(t)$	$\mathfrak{F}\{f(t)\} = \mathbf{F}(j\omega)$	$\lvert\mathbf{F}(j\omega)\rvert$
	$\delta(t - t_0)$	$e^{-j\omega t_0}$	
	$e^{j\omega_0 t}$	$2\pi\delta(\omega - \omega_0)$	
	$\cos \omega_0 t$	$\pi[\delta(\omega + \omega_0) + \delta(\omega - \omega_0)]$	
	1	$2\pi\,\delta(\omega)$	
	$\operatorname{sgn}(t)$	$\frac{2}{j\omega}$	
	$u(t)$	$\pi\,\delta(\omega) + \frac{1}{j\omega}$	
	$e^{-\alpha t}u(t)$	$\frac{1}{\alpha + j\omega}$	
	$e^{-\alpha t}\cos \omega_d t \cdot u(t)$	$\frac{\alpha + j\omega}{(\alpha + j\omega)^2 + \omega_d^2}$	
	$u(t + \frac{1}{2}T) - u(t - \frac{1}{2}T)$	$T\frac{\operatorname{sen}\frac{\omega T}{2}}{\frac{\omega T}{2}}$	

TABLA
TRANSFORMADA DE FOURIER DE SENOS

$f(t)$		$F_s[f(t)] = F_s(w)$
$\begin{cases} 1 & \text{si } 0 < t < a \\ 0 & \text{si } t > a \end{cases}$		$\dfrac{1-\cos aw}{w}$
t^{a-1}		$\dfrac{\Gamma(a)}{w^a}\,\text{sen}\left(\dfrac{aw}{2}\right)$
$\dfrac{1}{t}$		$\begin{cases} \pi/2 & \text{si } w > 0 \\ -\pi/2 & \text{si } w < 0 \end{cases}$
$\dfrac{1}{\sqrt{t}}$		$\sqrt{\dfrac{\pi}{2w}}$
$\dfrac{t}{a^2+t^2}$	$(a>0)$	$\dfrac{\pi}{2e^{aw}}$
$\dfrac{t}{(a^2+t^2)^2}$	$(a>0)$	$\dfrac{\pi w}{4ae^{aw}}$
e^{-at}	$(a>0)$	$\dfrac{w}{a^2+w^2}$
te^{-at}	$(a>0)$	$\dfrac{2aw}{(a^2+w^2)^2}$
$te^{-a^2t^2}$	$(a>0)$	$\dfrac{\sqrt{\pi}}{4a^3}\,w\,e^{-\frac{w^2}{4a^2}}$

TABLA
TRANSFORMADA DE FOURIER DE SENOS

$f(t)$		$F_s[f(t)] = F_s(w)$
$t^{-1}e^{-at}$	$(a>0)$	$\tan^{-1}\left(\dfrac{w}{a}\right)$
$\sqrt{\dfrac{2}{\pi t}}$		$\dfrac{1}{\sqrt{w}}$
$\dfrac{\text{sen}\,at}{t}$		$\dfrac{1}{2}\ln\left(\dfrac{w+a}{w-a}\right)$
$\dfrac{\text{sen}\,at}{t^2}$		$\begin{cases} \dfrac{\pi w}{2} & w < a \\ \dfrac{\pi a}{2} & w > a \end{cases}$
$\dfrac{\cos at}{t}$		$\begin{cases} 0 & w < a \\ \pi/4 & w = a \\ \pi/2 & w > a \end{cases}$
$\tan^{-1}\left(\dfrac{t}{a}\right)$		$\dfrac{\pi}{2we^{aw}}$
$\csc at$		$\dfrac{\pi}{2a}\tanh\dfrac{\pi w}{2a}$
$e^{-\frac{t}{\sqrt{2}}}\,\text{sen}\left(\dfrac{t}{\sqrt{2}}\right)$		$\dfrac{w}{1+w^4}$

TABLA
TRANSFORMADAS DE FOURIER DE COSENOS

$f(t)$	$F_c[f(t)] = F_c(w)$
$\begin{cases} 1 & \text{si } 0 < t < a \\ 0 & \text{si } t > a \end{cases}$	$\dfrac{\operatorname{sen} aw}{w}$
$t^{a-1} \quad 0 < a < 1$	$\dfrac{\Gamma(a)}{w^a} \cos \dfrac{aw}{2}$
$e^{-at} \quad a > 0$	$\dfrac{a}{a^2 + w^2}$
$e^{-\frac{t^2}{2}}$	$e^{-\frac{w^2}{2}}$
$e^{-at^2} \quad a > 0$	$\dfrac{1}{2}\sqrt{\dfrac{\pi}{a}}\, e^{-\frac{w^2}{4a}}$
$e^{-a^2t^2} \quad a > 0$	$\dfrac{\sqrt{\pi}}{2a} w e^{-\frac{w^2}{4a^2}}$
$t^{-\frac{1}{2}}$	$\sqrt{\dfrac{\pi}{2w}}$
t^{-n}	$\dfrac{\pi w^{n-1} \sec \dfrac{n\pi}{2}}{2\Gamma(n)}$
$\dfrac{1}{a^2 + t^2} \quad a > 0$	$\dfrac{\pi e^{-aw}}{2a}$

TABLA
TRANSFORMADAS DE FOURIER DE COSENOS

$f(t)$	$F_c[f(t)] = F_c(w)$
$\dfrac{1}{(a^2 + t^2)^2} \quad a > 0$	$\dfrac{\pi}{4a^3} e^{-aw}(1 + aw)$
$\dfrac{\operatorname{sen} at}{t}$	$\begin{cases} \pi/2 & w < a \\ \pi/4 & w = a \\ 0 & w > a \end{cases}$
$\operatorname{sen} at^2$	$\sqrt{\dfrac{\pi}{8a}}\left(\cos \dfrac{w^2}{4a} - \operatorname{sen} \dfrac{w^2}{4a}\right)$
$\cos at^2$	$\sqrt{\dfrac{\pi}{8a}}\left(\cos \dfrac{w^2}{4a} + \operatorname{sen} \dfrac{w^2}{4a}\right)$
$\operatorname{sen}\left(\dfrac{t^2}{2}\right)$	$\dfrac{\sqrt{\pi}}{2}\left[\cos\left(\dfrac{w^2}{2}\right) - \operatorname{sen}\left(\dfrac{w^2}{2}\right)\right]$
$\sqrt{\dfrac{2}{\pi t}}$	$\dfrac{1}{\sqrt{w}}$
$e^{-\frac{t}{\sqrt{2}}} \operatorname{sen}\left(\dfrac{\pi}{4} + \dfrac{t}{\sqrt{2}}\right)$	$\dfrac{1}{1 + w^2}$
$\dfrac{(1+t)}{2e^t}$	$\dfrac{1}{(1 + w^2)^2}$

TABLA

PARES DE TRANSFORMADAS DE FOURIER

$f(t)$		$F[f(t)] = F(w)$
$\begin{cases} 1 & \text{si} \quad \lvert t\rvert < a \\ 0 & \text{si} \quad \lvert t\rvert > a \end{cases}$		$\dfrac{2\,\text{sen}\, a w}{w}$
$\dfrac{1}{t}$		$\begin{cases} i & \text{si} \quad w > 0 \\ 0 & \text{si} \quad w = 0 \\ -i & \text{si} \quad w < 0 \end{cases}$
$e^{-a\lvert t\rvert}$	$(a > 0)$	$\dfrac{2a}{a^2 + w^2}$
$t e^{-a\lvert t\rvert}$	$(a > 0)$	$-\dfrac{4aiw}{(a^2 + w^2)^2}$
$\lvert t\rvert e^{-a\lvert t\rvert}$	$(a > 0)$	$\dfrac{2(a^2 - w^2)}{(a^2 + w^2)^2}$
$e^{-a^2 t^2}$	$(a > 0)$	$\dfrac{\sqrt{\pi}}{a} e^{-\frac{w^2}{4a^2}}$
$\dfrac{1}{a^2 + t^2}$	$(a > 0)$	$\dfrac{\pi}{a e^{a\lvert w\rvert}}$
$\dfrac{t}{a^2 + t^2}$	$(a > 0)$	$-\dfrac{\pi i w}{2a e^{a\lvert w\rvert}}$
$\delta(t)$		1