Transformada de Fourier - Tabela e Propriedades

$f(t)$	$F(\omega),\ F=\mathcal{F}(f)$
$e^{-at}\,u(t)$	$\frac{1}{a+i\omega}, a>0$
$e^{-a\lvert t\rvert}$	$\frac{2a}{a^2+\omega^2}, a>0$
$\delta(t)$	1
1	$2\pi\,\delta(\omega)$
$\cos(at)$	$\pi\,[\delta(\omega-a)+\delta(\omega+a)]$
$\mathrm{sen}(at)$	$\pi\,[\delta(\omega-a)-\delta(\omega+a)]$
$u(t)$	$\pi\delta(w)+\frac{1}{i\omega}$
$\mathrm{sgn}(t)$	$\frac{2}{i\omega}$
$\mathrm{rect}\left(\frac{t}{\tau}\right)$	$\tau\ \mathrm{sinc}\left(\frac{\omega\tau}{2}\right)$
$\frac{\tau}{\pi}\,\mathrm{sinc}(\tau t)$	$\mathrm{rect}\left(\frac{\omega}{2\tau}\right)$
$\triangle\left(\frac{t}{\tau}\right)$	$\frac{\tau}{2}\,\mathrm{sinc}^2\left(\frac{\omega\tau}{4}\right)$
$\frac{\tau}{2\pi}\,\mathrm{sinc}^2\left(\frac{\tau t}{2}\right)$	$\triangle\left(\frac{\omega}{2\tau}\right)$
$e^{-t^2/2\sigma^2}$	$\sigma\sqrt{2\pi}\,e^{-\sigma^2\omega^2/2}$

Identidade de Parseval:

$$\| f \|_2^2=\int_{\mathbb{R}} \lvert f(x)\rvert^2\,dx=\frac{1}{2\pi}\int_{\mathbb{R}}\lvert F(\omega)\rvert^2\,d\omega=\frac{1}{2\pi}\| F\|_2^2= \text{ energia do sinal } f, F=\mathcal{F}(f)$$

$f(t)$	$F(\omega),\ F=\mathcal{F}(f)$	propriedade
$F(t)$	$2\pi\,f(-\omega)$	simetria
$f(at), a\in\mathbb{R}$	$\frac{1}{\lvert a\rvert}\,F\left(\frac{\omega}{a}\right)$	escalonamento
$f(t-a)$	$F(\omega)\,e^{-i\omega a}$	deslocamento no tempo
$e^{iat}f(t)$	$F(\omega-a)$	deslocamento na freqüência
$(f*g)(t)$	$F(\omega)\,G(\omega)$	convolução no tempo
$f(t)\,g(t)$	$\frac{1}{2\pi}\,F(\omega)\star G(\omega)$	convolução na freqüência
$f^{(n)}(t)$	$i^n\omega^n\,F(\omega)$	derivação no tempo
$t^n f(t)$	$i^n\,F^{(n)}(\omega)$	derivação na freqüência
$\int_{-\infty}^{t} f(x)\,dx$	$\frac{F(\omega)}{i\omega}+\pi F(0)\,\delta(\omega)$	integração no tempo

Transformadas de Fourier

$$\hat{\mathrm{f}}(\omega)\equiv \mathrm{F}(\omega)\equiv\mathcal{F}\{\mathrm{f(t)}\}\stackrel{\mathrm{def}}{=}\int_{-\infty}^{\infty}\mathrm{f(t)}\ \mathrm{e}^{-\mathrm{i}\omega \mathrm{t}}\ \mathrm{dt}$$

Transformada de Fourier do dominio do tempo

$$\mathrm{f(t)}\equiv\mathcal{F}^{-1}\{\mathrm{F}(\omega)\}\stackrel{\mathrm{def}}{=}\frac{1}{2\pi}\int_{-\infty}^{\infty}\mathrm{F}(\omega)\ \mathrm{e}^{\mathrm{i}\omega \mathrm{t}}\ \mathrm{d}\omega$$

$\omega\equiv 2\pi\mathrm{f}$ (Frequência angular)

Forma Trigonométrica (senos e cossenos)

$$g(t) = a_0 + \sum_{n=1}^{\infty} a_n \cos(2\pi n f_0 t) + b_n \operatorname{sen}(2\pi n f_0 t),$$

$$a_n = \frac{\int_{t_1}^{t_1+T_0} g(t)\cos(2\pi n f_0 t)\,dt}{\int_{t_1}^{t_1+T_0} \cos^2(2\pi n f_0 t)\,dt} = \begin{cases} \dfrac{1}{T_0}\displaystyle\int_{t_1}^{t_1+T_0} g(t)\,dt, & n=0 \\ \dfrac{2}{T_0}\displaystyle\int_{t_1}^{t_1+T_0} g(t)\cos(2\pi n f_0 t)\,dt, & n=1,2,3,\ldots \end{cases}$$

$$b_n = \frac{\int_{t_1}^{t_1+T_0} g(t)\operatorname{sen}(2\pi n f_0 t)\,dt}{\int_{t_1}^{t_1+T_0} \operatorname{sen}^2(2\pi n f_0 t)\,dt} = \frac{2}{T_0}\int_{t_1}^{t_1+T_0} g(t)\operatorname{sen}(2\pi n f_0 t)\,dt, \quad n=1,2,3,\ldots$$

Fase e Magnitude:

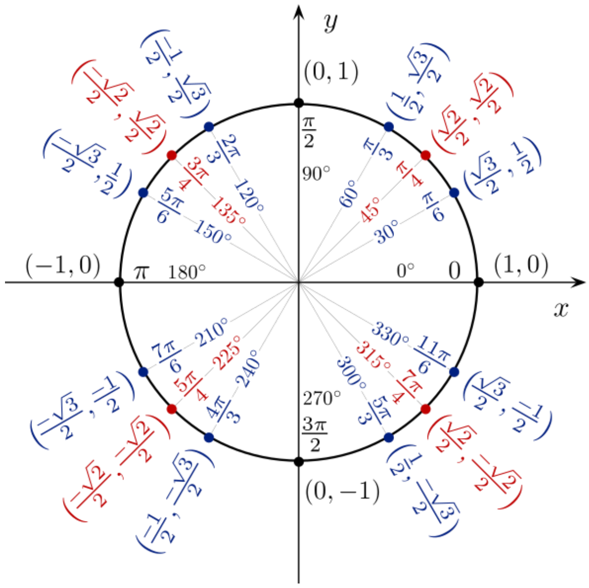
$$C_n = \sqrt{a_n^2 + b_n^2} \qquad \theta_n = -\operatorname{arctg}\left(\frac{b_n}{a_n}\right), \quad n \geq 1$$

Exponencial:

$$g(t) = \sum_{n=-\infty}^{\infty} D_n e^{j2\pi n f_0 t}$$

Tabela de Relações Trigonométricas

01) $\operatorname{sen}^2 x + \cos^2 x = 1$	02) $1 + \operatorname{tg}^2 x = \sec^2 x$
03) $1 + \operatorname{cotg}^2 x = \operatorname{cosec}^2 x$	04) $\operatorname{sen}(-x) = -\operatorname{sen} x$
05) $\cos(-x) = \cos x$	06) $\operatorname{tg}(-x) = -\operatorname{tg} x$
07) $\operatorname{cosec} x = \dfrac{1}{\operatorname{sen} x}$	08) $\sec x = \dfrac{1}{\cos x}$
09) $\operatorname{cotg} x = \dfrac{1}{\operatorname{tg} x}$	10) $\operatorname{tg} x = \dfrac{\operatorname{sen} x}{\cos x}$
11) $\operatorname{cotg} x = \dfrac{\cos x}{\operatorname{sen} x}$	12) $\operatorname{sen}(a \pm b) = \operatorname{sen} a.\cos b \pm \cos a.\operatorname{sen} b$
13) $\cos(a \pm b) = \cos a.\cos b \mp \operatorname{sen} a.\operatorname{sen} b$	14) $\operatorname{tg}(a+b) = \dfrac{\operatorname{tg} a + \operatorname{tg} b}{1 - \operatorname{tg} a.\operatorname{tg} b}$
15) $\operatorname{tg}(a-b) = \dfrac{\operatorname{tg} a - \operatorname{tg} b}{1 + \operatorname{tg} a.\operatorname{tg} b}$	16) $\cos^2 x = \dfrac{1}{2}(1 + \cos 2x)$
17) $\operatorname{sen}^2 x = \dfrac{1}{2}(1 - \cos 2x)$	18) $\operatorname{sen} 2x = 2 \operatorname{sen} x.\cos x$
19) $\cos 2x = \cos^2 x - \operatorname{sen}^2 x = 1 - 2\operatorname{sen}^2 x = 2\cos^2 x - 1$	20) $\operatorname{tg} 2x = \dfrac{2 \operatorname{tg} x}{1 - \operatorname{tg}^2 x}$
21) $\left\lvert \operatorname{sen} \dfrac{x}{2} \right\rvert = \sqrt{\dfrac{1 - \cos x}{2}}$	22) $\left\lvert \cos \dfrac{x}{2} \right\rvert = \sqrt{\dfrac{1 + \cos x}{2}}$
23) $\operatorname{tg} \dfrac{x}{2} = \dfrac{1 - \cos x}{\operatorname{sen} x} = \dfrac{\operatorname{sen} x}{1 + \cos x}$	24) $\operatorname{sen} x.\cos y = \dfrac{1}{2}[\operatorname{sen}(x-y) + \operatorname{sen}(x+y)]$
25) $\operatorname{sen} x.\operatorname{sen} y = \dfrac{1}{2}[\cos(x-y) - \cos(x+y)]$	26) $\cos x.\cos y = \dfrac{1}{2}[\cos(x-y) + \cos(x+y)]$
27) $\cos x.\operatorname{sen} y = \dfrac{1}{2}[\operatorname{sen}(x+y) - \operatorname{sen}(x-y)]$	28) $\operatorname{sen} x - \operatorname{sen} y = 2\operatorname{sen}\left(\dfrac{x-y}{2}\right).\cos\left(\dfrac{x+y}{2}\right)$
29) $\operatorname{sen} x.\cos x = \dfrac{1}{2}\operatorname{sen} 2x$	30) $1 - \cos x = 2\operatorname{sen}^2 \dfrac{x}{2}$
31) $1 + \cos x = 2\cos^2 \dfrac{x}{2}$	32) $1 \pm \operatorname{sen} x = 1 \pm \cos\left(\dfrac{\pi}{2} - x\right)$
33) $\cos 2\theta = \cos^2\theta - \operatorname{sen}^2\theta$	



y
x
$(0,1)$
$(1,0)$
$(-1,0)$
$(0,-1)$
$\frac{\pi}{2}$ $90°$
π $180°$
0 $0°$
$\frac{3\pi}{2}$ $270°$
$\frac{\pi}{6}$ $30°$ $\left(\frac{\sqrt{3}}{2}, \frac{1}{2}\right)$
$\frac{\pi}{4}$ $45°$ $\left(\frac{\sqrt{2}}{2}, \frac{\sqrt{2}}{2}\right)$
$\frac{\pi}{3}$ $60°$ $\left(\frac{1}{2}, \frac{\sqrt{3}}{2}\right)$
$\frac{2\pi}{3}$ $120°$ $\left(\frac{-1}{2}, \frac{\sqrt{3}}{2}\right)$
$\frac{3\pi}{4}$ $135°$ $\left(\frac{-\sqrt{2}}{2}, \frac{\sqrt{2}}{2}\right)$
$\frac{5\pi}{6}$ $150°$ $\left(\frac{-\sqrt{3}}{2}, \frac{1}{2}\right)$
$\frac{7\pi}{6}$ $210°$ $\left(\frac{-\sqrt{3}}{2}, \frac{-1}{2}\right)$
$\frac{5\pi}{4}$ $225°$ $\left(\frac{-\sqrt{2}}{2}, \frac{-\sqrt{2}}{2}\right)$
$\frac{4\pi}{3}$ $240°$ $\left(\frac{-1}{2}, \frac{-\sqrt{3}}{2}\right)$
$\frac{5\pi}{3}$ $300°$ $\left(\frac{1}{2}, \frac{-\sqrt{3}}{2}\right)$
$\frac{7\pi}{4}$ $315°$ $\left(\frac{\sqrt{2}}{2}, \frac{-\sqrt{2}}{2}\right)$
$\frac{11\pi}{6}$ $330°$ $\left(\frac{\sqrt{3}}{2}, \frac{-1}{2}\right)$