Table of Fourier Transform

Function or Theorem Name	Time Domain $f(t) = \mathcal{F}^{-1}\{F(\omega)\}$	Frequency Domain (Fourier) $F(\omega) = \mathcal{F}\{f(t)\}$
Definition	$\mathcal{F}\{f\}(\omega) = \int_{-\infty}^{\infty} f(t)e^{-j\omega t}dt$	$f(t) = \frac{1}{2\pi}\int_{-\infty}^{\infty} \mathcal{F}(\omega)e^{j\omega t}dt$
Dirac Delta	$\delta(t)$	1
Shifted Delta	$\delta(t-a)$	$e^{-i\omega a}$
Constant	1	$2\pi\delta(\omega)$
Unit Step (Heaviside)	$u(t)$	$\dfrac{1}{i\omega} + \pi\delta(\omega)$
Exponential (real)	$e^{-at}u(t),\ a>0$	$\dfrac{1}{a+i\omega}$
Positive Exponential	$e^{-a\lvert t\rvert},\ a>0$	$\dfrac{2a}{a^2+\omega^2}$
Complex Exponential	$e^{i\omega_0 t}$	$2\pi\delta(\omega-\omega_0)$
Sine	$\sin(\omega_0 t)$	$\dfrac{\pi}{i}\left[\delta(\omega-\omega_0)-\delta(\omega+\omega_0)\right]$
Cosine	$\cos(\omega_0 t)$	$\pi\left[\delta(\omega-\omega_0)+\delta(\omega+\omega_0)\right]$
Sine with Exponential	$e^{-at}\sin(\omega_0 t)\,u(t)$	$\dfrac{\omega_0}{(a+j\omega)^2+\omega_0^2}$
Cosine with Exponential	$e^{-at}\cos(\omega_0 t)\,u(t)$	$\dfrac{a+j\omega}{(a+j\omega)^2+\omega_0^2}$
Sine Combination	$t^n e^{-at}\sin(\omega_0 t)u(t),\ a>0$	$\frac{n!}{2j}\left[\frac{1}{\left(a+j(\omega-\omega_0)\right)^{n+1}} - \frac{1}{\left(a+j(\omega+\omega_0)\right)^{n+1}}\right]$
Cosine Combination	$t^n e^{-at}\cos(\omega_0 t)u(t),\ a>0$	$\frac{n!}{2}\left[\frac{1}{\left(a+j(\omega-\omega_0)\right)^{n+1}} + \frac{1}{\left(a+j(\omega+\omega_0)\right)^{n+1}}\right]$
Rectangular Pulse	$\text{rect}\left(\frac{t}{T}\right)$	$T\,\text{sinc}\left(\frac{\omega T}{2\pi}\right)$
Triangular Pulse	$\Delta\left(\frac{t}{T}\right)$	$T\,\text{sinc}^2\left(\frac{\omega T}{2\pi}\right)$
Sinc Function	$\text{sinc}\left(\frac{t}{T}\right)$	$T\text{rect}\left(\frac{\omega T}{2\pi}\right)$
Sinc Function Squared	$\text{sinc}^2\left(\frac{t}{T}\right)$	$T\Delta\left(\frac{\omega T}{2\pi}\right)$
Gaussian	e^{-t^2}	$\sqrt{\pi}\,e^{-\omega^2/4}$
Conjugate	$\overline{f(t)}$	$\overline{F(-\omega)}$
Duality	$F(t)$	$2\pi f(-\omega)$
Derivative (1st)	$f'(t)$	$i\omega F(\omega)$
Derivative (n-th)	$f^{(n)}(t)$	$(i\omega)^n F(\omega)$
Integrator	$\int_{-\infty}^{t} f(\tau)d\tau$	$\pi F(0)\delta(\omega) + \frac{F(\omega)}{j\omega}$
Multiplication by t	$t\,f(t)$	$i\,\dfrac{d}{d\omega}F(\omega)$
Time Shift	$f(t-\tau)$	$e^{-i\omega\tau}F(\omega)$
Scaling (time scaling)	$f(at)$	$\frac{1}{\lvert a\rvert}F\left(\frac{\omega}{a}\right)$
Frequency Shift (Modulation)	$e^{i\omega_0 t}f(t)$	$F(\omega-\omega_0)$
Convolution in Time	$(f*g)(t)$	$F(\omega)G(\omega)$
Convolution in Frequency	$f(t)g(t)$	$\dfrac{1}{2\pi}\left(F(\omega)*G(\omega)\right)$
Parseval / Energy Theorem	$\displaystyle\int_{-\infty}^{\infty}\lvert f(t)\rvert^2 dt$	$\displaystyle\frac{1}{2\pi}\int_{-\infty}^{\infty}\lvert F(\omega)\rvert^2 d\omega$