

## Table of important Fourier Transform Properties

(revised from <http://www.phy.ntnu.edu.tw/demolab/phpBB/viewtopic.php?topic=13674>)

	$f(t)$	Fourier transform	properties
	$F^{-1}[F(\omega)] = f(t) = \frac{1}{2\pi} \int_{-\infty}^{\infty} F(\omega) e^{i\omega t} d\omega$	$F(\omega) = \int_{-\infty}^{\infty} f(t) e^{-i\omega t} dt$	
1	$af(t) + bg(t)$	$aF(\omega) + bG(\omega)$	Linearity
2	$f(t - a)$	$e^{-ia\omega} F(\omega)$	Time Shifting
3	$e^{iat} f(t)$	$F(\omega - a)$	frequency shifting
4	$f(at)$	$ a ^{-1} F\left(\frac{\omega}{a}\right)$	scaling
5	$F(t)$	$f(-\omega)$	Time reversal
6	$\frac{d^n f(t)}{dt^n}$	$(i\omega)^n F(\omega)$	Differentiation in the time variable
7	$t^n f(t)$	$i^n \frac{d^n F(\omega)}{d\omega^n}$	Frequency differentiation
8	$(f * g)(t)$	$F(\omega)G(\omega)$	Time <u>convolution</u>
9	$f(t)g(t)$	$\frac{1}{2\pi} F(\omega)G(\omega)$	Frequency <u>convolution</u>