

12.4.8 Table of Fourier Transform Pairs

The following table includes the Fourier transform pairs that we have derived in this section as well as a number of other pairs that we will not derive.

Table of Fourier Transform Pairs	
<i>Time-Domain: $x(t)$</i>	<i>Frequency-Domain: $X(j\omega)$</i>
$e^{-at}u(t) \quad (a > 0)$	$\frac{1}{a + j\omega}$
$e^{bt}u(-t) \quad (b > 0)$	$\frac{1}{b - j\omega}$
$[u(t + \frac{1}{2}T) - u(t - \frac{1}{2}T)]$	$\frac{\sin(\omega T/2)}{\omega/2}$
$\frac{\sin(\omega_0 t)}{\pi t}$	$[u(\omega + \omega_0) - u(\omega - \omega_0)]$
$\delta(t)$	1
$\delta(t - t_0)$	$e^{-j\omega t_0}$
$u(t)$	$\pi\delta(\omega) + \frac{1}{j\omega}$
1	$2\pi\delta(\omega)$
$e^{j\omega_0 t}$	$2\pi\delta(\omega - \omega_0)$
$A \cos(\omega_0 t + \phi)$	$\pi A e^{j\phi} \delta(\omega - \omega_0) + \pi A e^{-j\phi} \delta(\omega + \omega_0)$
$\cos(\omega_0 t)$	$\pi\delta(\omega - \omega_0) + \pi\delta(\omega + \omega_0)$
$\sin(\omega_0 t)$	$-j\pi\delta(\omega - \omega_0) + j\pi\delta(\omega + \omega_0)$
$\sum_{k=-\infty}^{\infty} a_k e^{jk\omega_0 t}$	$\sum_{k=-\infty}^{\infty} 2\pi a_k \delta(\omega - k\omega_0)$

Table 12.1 Basic Fourier transform pairs.