

Appendix

Transform Tables

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Table of Representative Unilateral Laplace Transform Pairs

$x(t)$	$X(s)$
$\delta(t)$	1
$\delta(t - t_0)$	$e^{-s t_0}$ for $t_0 > 0$
$u(t)$	$\frac{1}{s}$ for $\text{Re}\{s\} > 0$
$e^{-at}u(t)$	$\frac{1}{s+a}$ for $\text{Re}\{s\} > -a$
$te^{-at}u(t)$	$\frac{1}{(s+a)^2}$ for $\text{Re}\{s\} > -a$
$e^{s_0 t}u(t)$	$\frac{1}{s+s_0}$ for $\text{Re}\{s\} > \text{Re}\{s_0\}$
$\cos(\omega_0 t)u(t)$	$\frac{s}{s^2+\omega_0^2}$ for $\text{Re}\{s\} > 0$
$\sin(\omega_0 t)u(t)$	$\frac{\omega_0}{s^2+\omega_0^2}$ for $\text{Re}\{s\} > 0$
$e^{-at} \cos(\omega_0 t)u(t)$	$\frac{s+a}{(s+a)^2+\omega_0^2}$ for $\text{Re}\{s\} > -a$
$e^{-at} \sin(\omega_0 t)u(t)$	$\frac{\omega_0}{(s+a)^2+\omega_0^2}$ for $\text{Re}\{s\} > -a$
$re^{-at} \cos(\omega_0 t + \theta)u(t)$	$\frac{(r \cos(\theta))s + (ar \cos(\theta) - \omega_0 r \sin(\theta))}{s^2 + 2as + (a^2 + \omega_0^2)}$ for $\text{Re}\{s\} > -a$
$e^{-at} \left[A \cos(\omega_0 t) + \frac{B-Aa}{\omega_0} \sin(\omega_0 t) \right] u(t)$ $\omega_0 = \sqrt{c - a^2}$	$\frac{As+B}{s^2+2as+c}$ for $\text{Re}\{s\} > -a$

Table of Representative Unilateral Z Transform Pairs

$x[n]$	$X(z)$
$\delta[n]$	1
$\delta[n - m]$	z^{-m} for $m > 0$
$u[n]$	$\frac{z}{z-1}$ for $ z > 1$
$nu[n]$	$\frac{z}{(z-1)^2}$ for $ z > 1$
$(a)^n u[n]$	$\frac{z}{z-a}$ for $ z > a$
$(a)^{n-1} u[n - 1]$	$\frac{1}{z-a}$ for $ z > a$

$x[n]$	$X(z)$
$n (a)^n u[n]$	$\frac{az}{(z-a)^2}$ for $ z > a$
$ a ^n \cos(\omega_0 n) u[n]$	$\frac{z(z- a \cos(\omega_0))}{z^2-(2 a \cos(\omega_0))z+ a ^2}$
$ a ^n \sin(\omega_0 n) u[n]$	$\frac{z a \sin(\omega_0)}{z^2-(2 a \cos(\omega_0))z+ a ^2}$
$r b ^n \cos(\omega_0 n + \theta) u[n]$	$\frac{z(Az+B)}{z^2+2az+ b ^2}$
$r = \sqrt{\frac{A^2 b ^2+B^2-2AaB}{ b ^2-a^2}}$	
$\omega_0 = \cos^{-1}\left(\frac{-a}{ b }\right)$	
$\theta = \tan^{-1}\left(\frac{Aa-B}{A\sqrt{ b ^2-a^2}}\right)$	