

Laplace transform $E(s)$	Time function $e(t)$	$z$ -Transform $E(z)$
$\frac{1}{s}$	$u(t)$	$\frac{z}{z-1}$
$\frac{1}{s^2}$	$t$	$\frac{Tz}{(z-1)^2}$
$\frac{1}{s^3}$	$\frac{t^2}{2}$	$\frac{T^2z(z+1)}{2(z-1)^3}$
$\frac{(k-1)!}{s^k}$	$t^{k-1}$	$\lim_{a \rightarrow 0} (-1)^{k-1} \frac{\partial^{k-1}}{\partial a^{k-1}} \left[ \frac{z}{z - \epsilon^{-at}} \right]$
$\frac{1}{s+a}$	$\epsilon^{-at}$	$\frac{z}{z - \epsilon^{-aT}}$
$\frac{1}{(s+a)^2}$	$t\epsilon^{-at}$	$\frac{Tz\epsilon^{-aT}}{(z - \epsilon^{-aT})^2}$
$\frac{(k-1)!}{(s+a)^k}$	$t^k\epsilon^{-at}$	$(-1)^k \frac{\partial^k}{\partial a^k} \left[ \frac{z}{z - \epsilon^{-aT}} \right]$
$\frac{a}{s(s+a)}$	$1 - \epsilon^{-at}$	$\frac{z(1 - \epsilon^{-aT})}{(z-1)(z - \epsilon^{-aT})}$
$\frac{a}{s^2(s+a)}$	$t - \frac{1 - \epsilon^{-at}}{a}$	$\frac{z[(aT-1 + \epsilon^{-aT})z + (1 - \epsilon^{-aT} - aT\epsilon^{-aT})]}{a(z-1)^2(z - \epsilon^{-aT})}$
$\frac{a^2}{s(s+a)^2}$	$1 - (1+at)\epsilon^{-at}$	$\frac{z}{z-1} - \frac{z}{z - \epsilon^{-aT}} - \frac{aT\epsilon^{-aT}z}{(z - \epsilon^{-aT})^2}$
$\frac{b-a}{(s+a)(s+b)}$	$\epsilon^{-at} - \epsilon^{-bt}$	$\frac{(\epsilon^{-aT} - \epsilon^{-bT})z}{(z - \epsilon^{-aT})(z - \epsilon^{-bT})}$
$\frac{a}{s^2+a^2}$	$\sin(at)$	$\frac{z \sin(aT)}{z^2 - 2z \cos(aT) + 1}$
$\frac{s}{s^2+a^2}$	$\cos(at)$	$\frac{z(z - \cos(aT))}{z^2 - 2z \cos aT + 1}$
$\frac{1}{(s+a)^2 + b^2}$	$\frac{1}{b}\epsilon^{-at} \sin bt$	$\frac{1}{b} \left[ \frac{z\epsilon^{-aT} \sin bT}{z^2 - 2z\epsilon^{-aT} \cos(bT) + \epsilon^{-2aT}} \right]$
$\frac{s+a}{(s+a)^2 + b^2}$	$\epsilon^{-at} \cos bt$	$\frac{z^2 - z\epsilon^{-aT} \cos bT}{z^2 - 2z\epsilon^{-aT} \cos bT + \epsilon^{-2aT}}$
$\frac{a^2 + b^2}{s[(s+a)^2 + b^2]}$	$1 - \epsilon^{-at} \left( \cos bt + \frac{a}{b} \sin bt \right)$	$\frac{z(Az + B)}{(z-1)(z^2 - 2z\epsilon^{-aT} \cos bT + \epsilon^{-2aT})}$ $A = 1 - \epsilon^{-aT} \left( \cos bT + \frac{a}{b} \sin bT \right)$ $B = \epsilon^{-2aT} + \epsilon^{-aT} \left( \frac{a}{b} \sin bT - \cos bT \right)$
$\frac{1}{s(s+a)(s+b)}$	$\frac{1}{ab} + \frac{\epsilon^{-at}}{a(a-b)}$ $+ \frac{\epsilon^{-bt}}{b(b-a)}$	$\frac{(Az + B)z}{(z - \epsilon^{-aT})(z - \epsilon^{-bT})(z-1)}$