

Table 1: Table of Laplace Transforms (we consider all functions (signals) as defined only on  $t \geq 0$ )

No	$f(t)$	$F(s)$
1	$\delta(t)$	1
2	$u(t)$	$\frac{1}{s}$
3	$t$	$\frac{1}{s^2}$
4	$t^n$	$\frac{n!}{s^{n+1}}$
5	$e^{\lambda t}$	$\frac{1}{s - \lambda}$
6	$te^{\lambda t}$	$\frac{1}{(s - \lambda)^2}$
7	$t^n e^{\lambda t}$	$\frac{n!}{(s - \lambda)^{n+1}}$
8a	$\cos bt$	$\frac{s}{s^2 + b^2}$
8b	$\sin bt$	$\frac{b}{s^2 + b^2}$
9a	$e^{-at} \cos bt$	$\frac{s + a}{(s + a)^2 + b^2}$
9b	$e^{-at} \sin bt$	$\frac{b}{(s + a)^2 + b^2}$
10a	$re^{-at} \cos(bt + \theta)$	$\frac{(r \cos \theta)s + (ar \cos \theta - br \sin \theta)}{s^2 + 2as + (a^2 + b^2)}$
10b	$re^{-at} \cos(bt + \theta)$	$\frac{0.5re^{j\theta}}{s + a - jb} + \frac{0.5re^{-j\theta}}{s + a + jb}$
10c	$re^{-at} \cos(bt + \theta)$	$\frac{As + B}{s^2 + 2as + c}$
$r = \sqrt{\frac{A^2c + B^2 - 2ABa}{c - a^2}}, \theta = \tan^{-1} \frac{Aa - B}{A\sqrt{c - a^2}}$		
$b = \sqrt{c - a^2}$		
10d	$e^{-at} \left[ A \cos bt + \frac{B - Aa}{b} \sin bt \right]$	$\frac{As + B}{s^2 + 2as + c}$
$b = \sqrt{c - a^2}$		

Table 2: Table of Laplace Transforms Properties

Operation	$f(t)$	$F(s)$
Addition	$f_1(t) + f_2(t)$	$F_1(s) + F_2(s)$
Scalar multiplication	$kf(t)$	$kF(s)$
Time differentiation	$\frac{df}{dt}$	$sF(s) - f(0)$
	$\frac{d^k f}{dt^k}$	$s^k F(s) - s^{k-1}f(0) - s^{k-2}\dot{f}(0) - \dots - f^{(k-1)}(0)$
Time integration	$\int_0^t f(\tau) d\tau$	$\frac{1}{s}F(s)$
Time shift	$f(t - T)$	$e^{-sT}F(s)$
Scaling	$f(at), a \geq 0$	$\frac{1}{a}F\left(\frac{s}{a}\right)$
Frequency shift	$e^{at}f(t)$	$F(s - a)$
Frequency differentiation	$-tf(t)$	$\frac{dF(s)}{ds}$
Frequency integration	$\frac{f(t)}{t}$	$\int_s^\infty F(s)ds$
Time convolution	$f_1(t) * f_2(t)$	$F_1(s)F_2(s)$