TABLE 7 Laplace transforms of causal functions

no.	$f(t)$	$F(s) = (\mathcal{L}f)(s) = \int_0^\infty f(t)e^{-st}dt$	*half-plane of convergence*	*condition(s)*
1	1	$\frac{1}{s}$	$\operatorname{Re} s > 0$	
2	e^{at}	$\frac{1}{s-a}$	$\operatorname{Re} s > \operatorname{Re} a$	$a \in \mathbb{C}$
3	t^n	$\frac{n!}{s^{n+1}}$	$\operatorname{Re} s > 0$	
4	$\sin at$	$\frac{a}{s^2+a^2}$	$\operatorname{Re} s > 0$	$a \in \mathbb{R}$
5	$\cos at$	$\frac{s}{s^2+a^2}$	$\operatorname{Re} s > 0$	$a \in \mathbb{R}$
6	$\sinh at$	$\frac{a}{s^2-a^2}$	$\operatorname{Re} s > a$	$a \in \mathbb{R}$
7	$\cosh at$	$\frac{s}{s^2-a^2}$	$\operatorname{Re} s > a$	$a \in \mathbb{R}$
8	$\sin(at+b)$	$\frac{a\cos b + s\sin b}{s^2+a^2}$	$\operatorname{Re} s > 0$	$a, b \in \mathbb{R}$
9	$\cos(at+b)$	$\frac{s\cos b - a\sin b}{s^2+a^2}$	$\operatorname{Re} s > 0$	$a, b \in \mathbb{R}$
10	$t^n e^{-at}$	$\frac{n!}{(s+a)^{n+1}}$	$\operatorname{Re} s > \operatorname{Re}(-a)$	$a \in \mathbb{C}$
11	$\epsilon(t-a)$	$\frac{e^{-as}}{s}$	$\operatorname{Re} s > 0$	$a > 0$

TABLE 8 Properties of the Laplace transform of causal functions

no.	$f(t), g(t)$	$F(s), G(s)$	*condition(s)*
1	$af(t) + bg(t)$	$aF(s) + bG(s)$	$a, b \in \mathbb{C}$
2	$\epsilon(t-a)f(t-a)$	$e^{-as}F(s)$	$a \geq 0$
3	$e^{at}f(t)$	$F(s-a)$	$a \in \mathbb{C}$
4	$f(at)$	$a^{-1}F(a^{-1}s)$	$a > 0$
5	$f^{(n)}(t)$	$s^n F(s)$	
6	$(-1)^n t^n f(t)$	$F^{(n)}(s)$	
7	$\int_0^t f(\tau)\, d\tau$	$\frac{F(s)}{s}$	
8	$(f * g)(t)$	$F(s)G(s)$	
9	$f(t)$	$\frac{\int_0^T f(t)e^{-st}dt}{1-e^{-sT}}$	$f(t+T) = f(t)$
10	$\lim_{s\to\infty} sF(s) = f(0+)$		
11	$\lim_{t\to\infty} f(t) = \lim_{s\to 0} sF(s)$		