Laplace Transform Properties

Function	Transform
$f(t)$	$F(s) \triangleq \int_{0^-}^{\infty} f(t) e^{-st} dt$
$\frac{1}{j2\pi} \int_{\sigma - j\infty}^{\sigma + j\infty} F(s) e^{st} ds$	$F(s)$
$Kx(t)$	$KX(s)$
$af(t) + bg(t)$	$aF(s) + bG(s)$
$x(at),\ a > 0$	$\frac{1}{a} F\left(\frac{s}{a}\right)$
$e^{-at} f(t)$	$F(s+a)$
$x'(t) = \frac{df(t)}{dt}$	$sF(s) - f(0^-)$
$x''(t) = \frac{d^2 f(t)}{dt^2}$	$s^2 F(s) - sf(0^-) - f'(0^-)$
$x^{(n)}(t) = \frac{d^n f(t)}{dt^n}$	$s^n F(s) - \sum_{k=1}^{n} s^{n-k} f^{(k)}(0^-)$
$tf(t)$	$-\frac{dF(s)}{ds}$ or $-F'(s)$
$t^2 f(t)$	$\frac{d^2 F(s)}{ds^2}$ or $F''(s)$
$t^n f(t)$	$(-1)^n \frac{d^n F(s)}{ds^n}$ or $(-1)^n F^{(n)}(s)$
$\frac{1}{t} f(t)$	$\int_s^{\infty} F(\xi) d\xi$
$f(t-a)u(t-a)$	$e^{-as} F(s)$
$f(t) = f(t+T)$	$\frac{1}{1 - e^{-sT}} \int_0^T e^{-s\lambda} f(\xi) d\xi$

$\int_{0^-}^{t^+} f(t-\tau)g(\tau)d\tau = \int_{0^-}^{t^+} f(\lambda)g(t-\lambda)d\lambda$	$F(s)G(s)$
$\int_{0^-}^{t^+} f(\tau)d\tau$	$\frac{1}{s}F(s)$
$\int_{0^-}^{t^+}\int_{0^-}^{t^+}\cdots\int_{0^-}^{t^+} f(\tau)d\tau^n$	$\frac{1}{s^n}F(s)$
$f(0^+)$	$\lim_{s\to\infty} sF(s)$
$f(\infty)$	$\lim_{s\to 0} sF(s)$
$f(t)g(t)$	$\frac{1}{j2\pi}\int_{\sigma_C-j\infty}^{\sigma_C+j\infty} F(\xi)G(s-\xi)d\xi$