Table of Laplace Transforms

In the table below c is a constant. The functions f and g are piecewise continuous functions of exponential type; F and G denote their Laplace transforms respectively. The Heavyside function $u_0(t)$ is defined to be equal to 1 for $t > 0$ and equal to 0 for $t < 0$, and δ_0 denotes the δ-"function" at 0. The restrictions on s in the Laplace transforms are omitted.

	Function	**Laplace transform**	
scale:	$f(ct)$	$\frac{1}{c}F(\frac{1}{c})$	$c > 0$
	$\frac{1}{c}f(\frac{1}{c})$	$F(ct)$	$c > 0$
shift:	$u_0(t-c)f(t-c)$	$e^{-cs}F(s)$	$c > 0$
	$e^{ct}f(t)$	$F(t-c)$	$c > 0$
diff:	$f^{(n)}(t)$	$s^nF(s) - (f^{(n-1)}(0) + sf^{(n-2)}(0) + \cdots + s^{n-1}f(0)$	
	$(-t)^n f(t)$	$F^{(n)}(s)$	
convolve	$(f * g)(t) = \int_0^t f(t-\tau)g(\tau)d\tau$	$F(s)G(s)$	
	1	$\frac{1}{s}$	
	δ_0	1	

Others can be derived from the Laplace of $f = 1$ and the rules above. For example:

$t^n e^{ct}$	$\frac{n!}{(s-c)^{n+1}}$	c real or complex

Writing $c = ib$, with $n = 0$ or $n = 1$ then taking real and imaginary parts:

$\cos bt$	$\frac{s}{s^2+b^2}$
$\sin bt$	$\frac{b}{s^2+b^2}$
$t\cos bt$	$\frac{s^2-b^2}{(s^2+b^2)^2}$
$t\sin bt$	$\frac{2bs}{(s^2+b^2)^2}$

A linear combination that is useful in dealing with partial fractions:

$\sin bt - bt\cos bt$	$\frac{2b^3}{(s^2+b^2)^2}$