Boston University
MA 226 Section A

Spring Semester	Differential Equations	2017

Standard Laplace Transforms

Function $f(t)$	Laplace transform $\mathscr{L}\{f\} = F(s) = \int_0^\infty f(t)e^{-st}\,dt$
e^{at}	$\frac{1}{s-a} \quad s > a$
1	$\frac{1}{s} \quad s > 0$
$\cos(\omega t)$	$\frac{s}{s^2+\omega^2} \quad s > 0$
$\sin(\omega t)$	$\frac{\omega}{s^2+\omega^2} \quad s > 0$
$t^n, n \in \mathbb{N}$	$\frac{n!}{s^{n+1}} \quad s > 0$
$H(t-a)$	$\frac{e^{-as}}{s} \quad s > 0,\ a \geq 0$
$\delta(t-a)$	$e^{-as} \quad s > 0,\ a > 0$

Properties of Laplace Transforms

Function	Laplace transform
$\alpha\, f(t) + \beta\, g(t)$	$\alpha\,\mathscr{L}\{f\} + \beta\,\mathscr{L}\{g\}$
$\frac{df}{dt}$	$s\,\mathscr{L}\{f\} - f(0)$
$\frac{d^2f}{dt^2}$	$s^2\,\mathscr{L}\{f\} - s\,f(0) - \left.\frac{df}{dt}\right\|_{t=0}$
$H(t-a)f(t-a)$	$e^{-as}\,\mathscr{L}\{f\}$
$e^{at}f(t)$	$F(s-a),\ F(s) := \mathscr{L}\{f\}$
$f(t) * g(t) := \int_0^t f(t-u)\,g(u)\,du$	$\mathscr{L}\{f\} \times \mathscr{L}\{g\}$