

FORMULA SHEET FOR EXAM 1, MATH 421

Function	Laplace transform
$f(t)$	$\mathcal{L}(f(t)) = F(s) = \int_0^\infty e^{st} f(t) dt$
$af(t) + bg(t)$	$aF(s) + bG(s)$
t^n for a positive integer n	$\frac{n!}{s^{n+1}}$
e^{at}	$\frac{1}{s-a}$
$\sin(kt)$	$\frac{k}{s^2 + k^2}$
$\cos(kt)$	$\frac{s}{s^2 + k^2}$
$e^{at}f(t)$	$F(s-a)$
$f(t-a)\mathcal{U}(t-a)$	$e^{-as}F(s)$
$g(t)\mathcal{U}(t-a)$	$e^{-as}\mathcal{L}(g(t+a))$
$f'(t)$	$sF(s) - f(0)$
$f''(t)$	$s^2F(s) - sf(0) - f'(0)$
$f^{(n)}(t)$	$s^nF(s) - s^{n-1}f(0) - \dots - f^{(n-1)}(0)$
$\int_0^t f(w)dw$	$\frac{F(s)}{s}$
$(f * g)(t) = \int_0^t f(t-\tau)g(\tau)d\tau$	$F(s)G(s)$
$\delta(t-a)$	e^{-as}
$t^n f(t)$	$(-1)^n \frac{d^n}{ds^n} F(s)$
$f(t+T) = f(t)$ (periodic)	$\frac{1}{1-e^{-sT}} \int_0^T e^{-st} f(t) dt$

$$\sin(A+B) = \sin A \cos B + \cos A \sin B$$

$$\cos(A+B) = \cos A \cos B - \sin A \sin B$$