

ECE222

Quiz 6

To get full credit, show all your work.

- 1) Find the partial fraction expansion of the function: $H(s) = \frac{3s+1}{s(s+1)^2}$

- 2) Find the unilateral Laplace transform of the function: $f(t) = [u(t+3) - u(t-2)]$

where $u(t)$ denotes the unit step function. (See the Laplace tables over the page).

An Abbreviated List of Laplace Transform Pairs

$f(t)$ ($t > 0^-$)	Type	$F(s)$
$\delta(t)$	(impulse)	1
$u(t)$	(step)	$\frac{1}{s}$
t	(ramp)	$\frac{1}{s^2}$
e^{-at}	(exponential)	$\frac{1}{s+a}$
$\sin \omega t$	(sine)	$\frac{\omega}{s^2 + \omega^2}$
$\cos \omega t$	(cosine)	$\frac{s}{s^2 + \omega^2}$
te^{-at}	(damped ramp)	$\frac{1}{(s+a)^2}$
$e^{-at} \sin \omega t$	(damped sine)	$\frac{\omega}{(s+a)^2 + \omega^2}$
$e^{-at} \cos \omega t$	(damped cosine)	$\frac{s+a}{(s+a)^2 + \omega^2}$

An Abbreviated List of Operational Transforms

$f(t)$	$F(s)$
$Kf(t)$	$KF(s)$
$f_1(t) + f_2(t) - f_3(t) + \dots$	$F_1(s) + F_2(s) - F_3(s) + \dots$
$\frac{df(t)}{dt}$	$sF(s) - f(0^-)$
$\frac{d^2 f(t)}{dt^2}$	$s^2 F(s) - sf(0^-) - \frac{df(0^-)}{dt}$
$\frac{d^n f(t)}{dt^n}$	$s^n F(s) - s^{n-1} f(0^-) - s^{n-2} \frac{df(0^-)}{dt} - s^{n-3} \frac{d^2 f(0^-)}{dt^2} - \dots - \frac{d^{n-1} f(0^-)}{dt^{n-1}}$
$\int_0^t f(x) dx$	$\frac{F(s)}{s}$
$f(t-a)u(t-a), a > 0$	$e^{-as} F(s)$
$e^{-at} f(t)$	$F(s+a)$
$f(at), a > 0$	$\frac{1}{a} F\left(\frac{s}{a}\right)$
$tf(t)$	$-\frac{dF(s)}{ds}$
$t^n f(t)$	$(-1)^n \frac{d^n F(s)}{ds^n}$
$\frac{f(t)}{t}$	$\int_s^\infty F(u) du$