4^a Lista , EDO

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$t \geq 0$	$\mathcal{L}(f)$
1	$\frac{1}{s}$
e^{at}	$\frac{1}{s-a}$
t^n	$\frac{n!}{s^{n+1}}$
$sen(at)$	$\frac{a}{s^2+a^2}$
$cos(at)$	$\frac{s}{s^2+a^2}$
$senh(at)$	$\frac{a}{s^2-a^2}$
$cosh(at)$	$\frac{s}{s^2-a^2}$

Para resolver esta lista lembrar ________________

Primeiro Teorema de Translação:

$$\mathcal{L}\left(e^{at}f(t)\right) = \mathcal{L}(f)(s-a).$$

Segundo Teorema de Translação:

$$\mathcal{L}\left(\mathcal{U}(t-a)f(t-a)\right) = e^{-as}\mathcal{L}(f).$$

Teorema:

$$\mathcal{L}(f^{(n)}) = s^n\mathcal{L}(f) - s^{(n-1)}f(0) - \cdots - f^{(n-1)}(0)$$

Teorema:

$$\mathcal{L}(t^n f(t)) = (-1)^n \frac{d^n}{ds^n}\mathcal{L}(f)$$

Teorema:

$$\mathcal{L}(f * g) = \mathcal{L}(f).\mathcal{L}(g)$$

1_ Calcule:

a) $\mathcal{L}\{t^{10}+3t^4\}$ *b)* $\mathcal{L}\{sen(7t)\}$ *c)* $\mathcal{L}\{t^3 senh(2t)\}$ *d)* $\mathcal{L}\{t^4e^{4t}\}$

e) $\mathcal{L}\{e^{3t}\cosh 5t\}$ *f)* $\mathcal{L}\{e^{2t}senh(10t)\}$ *g)* $\mathcal{L}\{\frac{e^{at}-e^{bt}}{a-b}\}$

h) $\mathcal{L}\{e^{3t-2}\mathcal{U}(t-1)\}$ *i)* $\mathcal{L}\{\mathcal{U}(t-\pi)sen(10t-2)\}$ *j)* $\mathcal{L}\{e^{4t}\mathcal{U}(t-\pi)\}$

2_ Resolva:

$a)\quad \mathcal{L}^{-1}\{\frac{2}{(s-2)^3}\}$,	$b)\quad \mathcal{L}^{-1}\{(1+e^{-2s})/(s+1)\}$,	$c)\quad \mathcal{L}^{-1}\{e^{2s}(s^3-1)\}$
$d)\quad \mathcal{L}^{-1}\{\frac{s}{(s^2+2)^2}\}$,	$e)\quad \mathcal{L}^{-1}\{s^2/(s^2-1)^2\}$	$f)\quad \mathcal{L}^{-1}\{e^{-6s}(s-1)^3\}$
$g)\quad \mathcal{L}^{-1}\{s/(s-1)^3(s^2+3)\}$,	$h)\quad \mathcal{L}^{-1}\{e^{3s}(s-1)^3\}$	$i)\quad \mathcal{L}^{-1}\{4/(s-3)^4\}$,
$j)\quad \mathcal{L}^{-1}\{1/(s^2+6s+34)(s-1)^2\}$,	$k)\quad \mathcal{L}^{-1}\{s^2-1/(s-3)^4\}$,	$l)\quad \mathcal{L}^{-1}\{(s-1)^2/(s^2+6s)\}$,
$m)\quad \mathcal{L}^{-1}\{e^{\pi s}/(s^2+2s-5)\}$,	$n)\quad \mathcal{L}^{-1}\{e^{3(s-8)}(s^2-1)\}$	$o)\quad \mathcal{L}^{-1}\{s/[(s-3)^2+1]\}$,
$p)\quad \mathcal{L}^{-1}\{s^2/(s^2+s-7)\}$,	$q)\quad \mathcal{L}^{-1}\{(e^{2\sqrt[4]{3}}s-1)/(s-3)^4\}$,	$r)\quad \mathcal{L}^{-1}\{(s-1)/(s^2+s+1)\}$

3_ Encontre a trasformadas de Laplace das seguintes funções (Usar, $\mathcal{U}(t-a)$, a função degrau unitario):

$a)\quad f(t)=\begin{cases}-1, & 0\leq t<1\\ 1, & t\geq 1\end{cases}$, $\quad b) f(t)=\begin{cases}t, & 0\leq t<1\\ 1, & t\geq 1\end{cases}$

$c)\quad f(t)=\begin{cases}0, & 0\leq t<\pi/2\\ cost, & t\geq \pi/2\end{cases}$, $\quad d) f(t)=\begin{cases}sent, & 0\leq t<\pi\\ 1+cost, & t\geq \pi\end{cases}$

$e)\quad f(t)=\begin{cases}2, & 0\leq t<1\\ e^{3t}t^4, & 1\leq t<2\\ 2, & t\geq 2\end{cases}$ $\quad f) f(t)=\begin{cases}t^2 sen(t), & 0\leq t<\pi\\ e^{2t}cos4t+t^2 sent, & \pi\leq t<2\pi\\ t^2 sen(t), & t\geq 2\pi\end{cases}$

4_ Use a transformada de Laplace para resolver,

a) $y" - y' - e^t sen(2t) = 0,\ y(0)=2,\ y'(0)=1$

b) $y" + y' + y = e^{3t},\ y(0)=1,\ y'(0)=2$

c) $y" - 6y' + 9y = te^{3t},\ y(0)=1,\ y'(0)=1$

d) $y" + 4y' + 6y = 1 - e^{-t},\ y(0)=1,\ y'(0)=1,$

e) $y' - y = e^t sen(2t),\ y(0)=0$

f) $y' - y = e^{5t} sen(3t),\ y(0)=4$

g) $2y" - y' = t^2 + e^{2t} sen(2t),\ y(0)=5,\ y'(0)=1$

h) $y" + 2y' + 2y = e^{3t}(1+t)^4,\ y(0)=1,\ y'(0)=1$

i) $y" - y' + 2y = t,,\ y(0)=0,\ y'(0)=1,$

j) $y" + 4y' + 6y = 10e^{2t},\ y(0)=1,\ y'(0)=1$

k) $y"(t) = 1 - sent - \int_0^t y(\tau)d\tau$

l) $\dfrac{dy}{dx} + 6y(t) + 9\int_0^t y(\tau)d\tau = 1$

m) $\begin{cases}y^{(4)} - y = e^t cos(6t)\\ y(0)=y'(0)=0\\ y''(0)=y'''(0)=1\end{cases}$

n) $\begin{cases}2y''-5y'+y=f(t)\\ y(0)=1,\\ y'(0)=2.\end{cases}$ $f(t)$ como em ex.3

5_ Use a transformada de Laplace para encontrar f,

a) $f(t) + \int_0^t (t-\tau)f(\tau)d\tau = t,$ b) $f(t) = 2t - 4\int_0^t sen\tau f(t-\tau)d\tau.$