TRANSFORMADA DE LAPLACE E PROPRIEDADES

Transformada de Laplace de $f(t)$**:** $L[f(t)] = F(s) = \int_0^{\infty} e^{-st} f(t)\,dt$

Transformada inversa de Laplace de $F(s)$**:** $L^{-1}[F(s)] = f(t)$ **se** $L[f(t)] = F(s) = \int_0^{\infty} e^{-st} f(t)\,dt$

	Transformada	Transformada inversa
1	$L[\delta(t-a)] = e^{-as}$	$L^{-1}[e^{-as}] = \delta(t-a)$
2	$L[u(t-a)] = \dfrac{e^{-as}}{s}$	$L^{-1}\left[\dfrac{e^{-as}}{s}\right] = u(t-a)$
3	$L[e^{at}] = \dfrac{1}{s-a}$	$L^{-1}\left[\dfrac{1}{s-a}\right] = e^{at}$
4	$L[\cos(at)] = \dfrac{s}{s^2+a^2}$	$L^{-1}\left[\dfrac{s}{s^2+a^2}\right] = \cos(at)$
5	$L[\text{sen}(at)] = \dfrac{a}{s^2+a^2}$	$L^{-1}\left[\dfrac{a}{s^2+a^2}\right] = \text{sen}(at)$
6	$L[\cosh(at)] = \dfrac{s}{s^2-a^2}$	$L^{-1}\left[\dfrac{s}{s^2-a^2}\right] = \cosh(at)$
7	$L[\text{senh}(at)] = \dfrac{a}{s^2-a^2}$	$L^{-1}\left[\dfrac{a}{s^2-a^2}\right] = \text{senh}(at)$
8	$L[t^n] = \dfrac{n!}{s^{n+1}},\ n = 1,2,3,\ldots$	$L^{-1}\left[\dfrac{1}{s^{n+1}}\right] = \dfrac{1}{n!}t^n,\ n = 1,2,3,\ldots$
9	$L[t^n \cdot e^{at}] = \dfrac{n!}{(s-a)^{n+1}},\ n = 1,2,3,\ldots$	$L^{-1}\left[\dfrac{1}{(s-a)^{n+1}}\right] = \dfrac{1}{n!}t^n \cdot e^{at},$
10	$L[e^{at}\cos(bt)] = \dfrac{s-a}{(s-a)^2+b^2}$	$L^{-1}\left[\dfrac{s-a}{(s-a)^2+b^2}\right] = e^{at}\cos(bt)$
11	$L[e^{at}\text{sen}(bt)] = \dfrac{b}{(s-a)^2+b^2}$	$L^{-1}\left[\dfrac{b}{(s-a)^2+b^2}\right] = e^{at}\text{sen}(bt)$
12	$L[e^{at}f(t)] = F(s-a)$	$L^{-1}[F(s-a)] = e^{at}L^{-1}[F(s)]$
13	$L[f'(t)] = s\,L[f(t)] - f(0)$	
14	$L[f^{(n)}(t)] = s^n\,L[f(t)] - s^{n-1}f(0) - \cdots - f^{(n-1)}(0$	
15	$L\left[\int_0^t f(\tau)\,d\tau\right] = \dfrac{1}{s}L[f(t)]$	$L^{-1}\left[\dfrac{1}{s}F(s)\right] = \int_0^t L^{-1}[F(s)](\tau)\,d\tau$
16	$L\left[t^n \cdot f(t)\right] = (-1)^n \dfrac{d^n}{ds^n}L[f(t)]$	$L^{-1}\left[\dfrac{d^n}{ds^n}F(s)\right] = (-1)^n t^n \cdot L^{-1}[F(s)$
17	$L\left[u(t-a)\cdot f(t-a)\right] = e^{-as}L[f(t)]$	$L^{-1}\left[e^{-as}F(s)\right] = u(t-a)\cdot f(t-a)$
18	$L\left[u(t-a)\cdot f(t)\right] = e^{-as}L\left[f(t+a)\right]$	
19	$L\left[\int_0^t f(t-v)g(v)\,dv\right] = F(s)\cdot G(s)$	$L^{-1}\left[F(s)\cdot G(s)\right] = \int_0^t f(t-v)g(v)\,dv$
20	$L\left[\dfrac{f(t)}{t}\right] = \int_s^{+\infty} L[f(t)](v)\,dv$, se $\lim\limits_{t\to 0}\dfrac{f(t)}{t}$ finito	$L^{-1}\left[\int_s^{+\infty} F(v)\,dv\right] = \dfrac{1}{t}L^{-1}\left[F(s)\right]$