

Additional Formulas

T1 direct If $\mathcal{L}\{f(t)\} = F(s)$ then $\mathcal{L}\{e^{at}f(t)\} = F(s-a)$

T1 inverse $\mathcal{L}^{-1}\{F(s)\} = e^{at}\mathcal{L}^{-1}\{F(s+a)\}$

T2 direct $\mathcal{L}\{f(t) \cdot \mathcal{L}(t-a)\} = e^{-as}\mathcal{L}\{f(t+a)\}$

T2 inverse If $\mathcal{L}^{-1}\{F(s)\} = f(t)$ then $\mathcal{L}^{-1}\{e^{-as}F(s)\} = f(t-a)\mathcal{L}(t-a)$

T3 $\mathcal{L}\{t^n \cdot f(t)\} = (-1)^n \frac{d^n}{ds^n} (\mathcal{L}\{f(t)\})$

T4 $\mathcal{L}\{f'(t)\} = s \cdot \mathcal{L}\{f(t)\} - f(0)$

$$\mathcal{L}\{f''(t)\} = s^2 \cdot \mathcal{L}\{f(t)\} - s \cdot f(0) - f'(0)$$

$$\mathcal{L}\{f^{(n)}(t)\} = s^n \cdot \mathcal{L}\{f(t)\} - s^{n-1} \cdot f(0) - s^{n-2} \cdot f'(0) - \dots - s \cdot f^{(n-2)}(0) - f^{(n-1)}(0)$$

T5 $\mathcal{L}\left\{\int_0^t f(\tau) d\tau\right\} = \frac{1}{s} \cdot \mathcal{L}\{f(t)\}$

T6 $\mathcal{L}\{f(t) * g(t)\} = \mathcal{L}\{f(t)\} \cdot \mathcal{L}\{g(t)\}$