Math/Mthe 225: Table of Laplace Transforms

- $\mathcal{L}\{1\} = \dfrac{1}{s}$.
- $\mathcal{L}\{t^n\} = \dfrac{n!}{s^{n+1}}$, for $n \in \mathbb{N}$.
- $\mathcal{L}\{t^a\} = \dfrac{\Gamma(a+1)}{s^{n+1}}$, for any $a > -1$.
- $\mathcal{L}\{e^{at}\} = \dfrac{1}{s-a}$, for any $a \in \mathbb{R}$.
- $\mathcal{L}\{\sin(kt)\} = \dfrac{k}{s^2+k^2}$, for any $k \in \mathbb{R}$.
- $\mathcal{L}\{\cos(kt)\} = \dfrac{s}{s^2+k^2}$, for any $k \in \mathbb{R}$.
- $\mathcal{L}\{\sinh(kt)\} = \dfrac{k}{s^2-k^2}$, for any $k \in \mathbb{R}$.
- $\mathcal{L}\{\cosh(kt)\} = \dfrac{s}{s^2-k^2}$, for any $k \in \mathbb{R}$.
- $\mathcal{L}\{x'(t)\} = sX(s) - x(0)$, where $X(s) = \mathcal{L}\{x(t)\}$.
- $\mathcal{L}\{x''(t)\} = s^2X(s) - sx(0) - x'(0)$, where $X(s) = \mathcal{L}\{x(t)\}$.
- $\mathcal{L}\{x^{(n)}(t)\} = s^nX(s) - s^{n-1}x(0) - s^{n-2}x'(0) - \ldots - x^{(n-1)}(0)$, if $n \in \mathbb{N}$ and $X(s) = \mathcal{L}\{x(t)\}$.
- $\mathcal{L}\{e^{at}f(t)\} = F(s-a)$, where $F(s) = \mathcal{L}\{f(t)\}$.
- $\mathcal{L}\{u_a(t)f(t-a)\} = e^{-as}F(s)$, where $F(s) = \mathcal{L}\{f(t)\}$ and $u_a(t) = \begin{cases} 1 & \text{if } t \geq a, \\ 0 & \text{if } t < a. \end{cases}$