Summary of Laplace Transform Facts

$$\mathcal{L}\{1\} = \frac{1}{s}$$

$$\mathcal{L}\{t^n\} = \frac{n!}{s^{n+1}}$$

$$\mathcal{L}\{e^{at}\} = \frac{1}{s-a}$$

$$\mathcal{L}\{\sin(\omega t)\} = \frac{\omega}{s^2+\omega^2}$$

$$\mathcal{L}\{\cos(\omega t)\} = \frac{s}{s^2+\omega^2}$$

$$\mathcal{L}\{\sinh(\omega t)\} = \frac{\omega}{s^2-\omega^2}$$

$$\mathcal{L}\{\cosh(\omega t)\} \quad \frac{s}{s^2-\omega^2}$$

$$\mathcal{L}\{e^{at} f(t)\} = F(s-a) = F(s)\Big|_{s \to s-a}$$

$$\mathcal{L}\{u_a(t) f(t-a)\} = e^{-as} F(s)$$

$$\mathcal{L}\{t\, f(t)\} = -\frac{d}{ds} F(s)$$

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

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

$$\mathcal{L}\left\{\frac{d^n f}{dt^n}\right\} = s^n F(s) - s^{n-1} f(0) - s^{n-2} f'(0) - \cdots - f^{(n-1)}(0)$$

($n-1$ derivative)