TABLE OF LAPLACE TRANSFORMS:

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

$$\mathcal{L}\{t\} = \frac{1}{s^2}$$

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

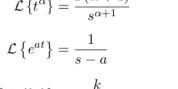$$\mathcal{L}\{t^{-1/2}\} = \frac{\sqrt{\pi}}{s^{1/2}}$$

$$\mathcal{L}\{t^{1/2}\} = \frac{\sqrt{\pi}}{2s^{3/2}}$$

$$\mathcal{L}\{t^\alpha\} = \frac{\Gamma(\alpha+1)}{s^{\alpha+1}}$$

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

$$\mathcal{L}\{\sin(kt)\} = \frac{k}{s^2 + k^2}$$

$$\mathcal{L}\{\cos(kt)\} = \frac{s}{s^2 + k^2}$$

$$\mathcal{L}\{\sinh(kt)\} = \frac{k}{s^2 - k^2}$$

$$\mathcal{L}\{\cosh(kt)\} = \frac{s}{s^2 - k^2}$$

$$\mathcal{L}\{te^{at}\} = \frac{1}{(s-a)^2}$$

$$\mathcal{L}\{t^n e^{at}\} = \frac{n!}{(s-a)^{n+1}}$$

$$\mathcal{L}\{e^{at}\sin(kt)\} = \frac{k}{(s-a)^2 + k^2}$$

$$\mathcal{L}\{e^{at}\cos(kt)\} = \frac{s-a}{(s-a)^2 + k^2}$$

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

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

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

$$\mathcal{L}\{\mathcal{U}(t-a)\} = \frac{e^{-as}}{s}$$

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

$$\mathcal{L}\{g(t)\mathcal{U}(t-a)\} = e^{-as}\mathcal{L}\{g(t+a)\}$$

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

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

$$(f * g)(t) = \int_0^t f(\tau)g(t-\tau)\,d\tau$$

$$\mathcal{L}\{f * g\} = F(s)G(s)$$