Properties and Formulas for Laplace Transform

Let $F(s) = \mathcal{L}\{f(t)\} = \int_0^\infty e^{-st} f(t)\,dt$ and $G(s) = \mathcal{L}\{g(t)\} = \int_0^\infty e^{-st} g(t)\,dt$.
In the following a and b are arbitrary constants and n is some positive integer.

$$\mathcal{L}\{af + bg\} = aF(s) + bG(s) \tag{1}$$

$$\mathcal{L}\{f'\} = sF(s) - f(0) \tag{2}$$

$$\mathcal{L}\{f''\} = s^2F(s) - sf(0) - f'(0) \tag{3}$$

$$\mathcal{L}\left\{f^{(n)}\right\} = s^nF(s) - s^{n-1}f(0) - s^{n-2}f'(0) - \cdots - f^{(n-1)}(0) \tag{4}$$

$$\mathcal{L}\left\{e^{at}f(t)\right\} = F(s-a) \tag{5}$$

$$\mathcal{L}\{f(t-a)u(t-a)\} = e^{-as}F(s) \tag{6}$$

$$\mathcal{L}\{tf(t)\} = -F'(s) \tag{7}$$

$$\mathcal{L}\{f * g(t)\} = F(s)G(s) \tag{8}$$

$$\mathcal{L}\{\delta(t)\} = 1 \tag{9}$$

$$\mathcal{L}\{t^n\} = \frac{n!}{s^{n+1}} \tag{10}$$

$$\mathcal{L}\left\{e^{at}\right\} = \frac{1}{s-a} \tag{11}$$

$$\mathcal{L}\left\{t^ne^{at}\right\} = \frac{n!}{(s-a)^{n+1}} \tag{12}$$

$$\mathcal{L}\{\cos bt\} = \frac{s}{s^2+b^2} \tag{13}$$

$$\mathcal{L}\{\sin bt\} = \frac{b}{s^2+b^2} \tag{14}$$

$$\mathcal{L}\left\{e^{at}\cos bt\right\} = \frac{s-a}{(s-a)^2+b^2} \tag{15}$$

$$\mathcal{L}\left\{e^{at}\sin bt\right\} = \frac{b}{(s-a)^2+b^2} \tag{16}$$