

Elementary Laplace Transforms

$$\mathcal{L}(1)(s) = \frac{1}{s} \quad (s > 0) \quad (1)$$

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

$$\mathcal{L}(t^n)(s) = \frac{n!}{s^{n+1}} \quad (s > 0, n \text{ a positive integer}) \quad (3)$$

$$\mathcal{L}(t^p)(s) = \frac{\Gamma(p+1)}{s^{p+1}} \quad (s > 0, p > -1) \quad (4)$$

$$\mathcal{L}(\sin(bt))(s) = \frac{b}{s^2 + b^2} \quad (s > 0) \quad (5)$$

$$\mathcal{L}(\cos(bt))(s) = \frac{s}{s^2 + b^2} \quad (s > 0) \quad (6)$$

$$\mathcal{L}(e^{at} \cdot \sin(bt))(s) = \frac{b}{(s-a)^2 + b^2} \quad (s > a) \quad (7)$$

$$\mathcal{L}(e^{at} \cdot \cos(bt))(s) = \frac{s-a}{(s-a)^2 + b^2} \quad (s > a) \quad (8)$$

$$\mathcal{L}(t^n \cdot e^{at})(s) = \frac{n!}{(s-a)^{n+1}} \quad (s > a) \quad (9)$$

$$\mathcal{L}(t^n \cdot f(t))(s) = (-1)^n \frac{d^n}{ds^n} (\mathcal{L}(f(t)))(s) \quad (10)$$

$$\mathcal{L}(f'(t))(s) = s \cdot \mathcal{L}(f(t))(s) - f(0) \quad (11)$$

$$\mathcal{L}(f''(t))(s) = s^2 \cdot \mathcal{L}(f(t))(s) - s \cdot f(0) - f'(0) \quad (12)$$

$$\mathcal{L}(u_c(t))(s) = \frac{e^{-cs}}{s} \quad (s > 0) \quad (13)$$

$$\mathcal{L}(u_c(t) \cdot f(t-c))(s) = e^{-cs} \mathcal{L}(f(t))(s) \quad (14)$$

$$\mathcal{L}(u_c(t) \cdot f(t))(s) = e^{-cs} \mathcal{L}(f(t+c))(s) \quad (15)$$

$$\mathcal{L}(\delta_c(t))(s) = e^{-cs} \quad (16)$$

$$\mathcal{L}(e^{ct} \cdot f(t))(s) = \mathcal{L}(f(t))(s-c) \quad (17)$$