Table of Laplace Transforms

$$f(t) = \mathcal{L}^{-1} \{F(s)\} \qquad F(s) = \mathcal{L} \{f(t)\} \qquad f(t) = \mathcal{L}^{-1} \{F(s)\} \qquad F(s) = \mathcal{L} \{f(t)\}$$

$$1. \qquad 1 \qquad \frac{1}{s} \qquad 2. \qquad e^{st} \qquad \frac{1}{s-a}$$

$$3. \qquad t^{s}, \quad n = 1, 2, 3, \dots \qquad \frac{n!}{s^{s+1}} \qquad 4. \qquad t^{p}, p > -1 \qquad \frac{\Gamma(p+1)}{s^{p+1}}$$

$$5. \qquad \sqrt{t} \qquad \sqrt{\pi} \qquad 6. \qquad t^{s+1}, \quad n = 1, 2, 3, \dots \qquad \frac{1 \cdot 3 \cdot 5 \cdots (2n-1) \sqrt{\pi}}{2^{s}}$$

$$7. \quad \sin(at) \qquad \frac{a}{s^{2} + a^{2}} \qquad 8. \quad \cos(at) \qquad \frac{s}{s^{2} + a^{2}}$$

$$9. \quad t \sin(at) \qquad \frac{2as}{(s^{2} + a^{2})^{2}} \qquad 10. \quad t \cos(at) \qquad \frac{s^{2} - a^{2}}{(s^{2} + a^{2})^{2}}$$

$$11. \quad \sin(at) - at \cos(at) \qquad \frac{2a^{3}}{(s^{2} + a^{2})^{2}} \qquad 12. \quad \sin(at) + at \cos(at) \qquad \frac{2as^{2}}{(s^{2} + a^{2})^{2}}$$

$$13. \quad \cos(at) - at \sin(at) \qquad \frac{s(s^{2} - a^{2})}{(s^{2} + a^{2})^{2}} \qquad 14. \quad \cos(at) + at \sin(at) \qquad \frac{s(s^{2} + a^{2})^{2}}{(s^{2} + a^{2})^{2}}$$

$$15. \quad \sin(at + b) \qquad \frac{s\sin(b) + a\cos(b)}{s^{2} + a^{2}} \qquad 16. \quad \cos(at + b) \qquad \frac{s\cos(b) - a\sin(b)}{s^{2} + a^{2}}$$

$$17. \quad \sinh(at) \qquad \frac{a}{s^{2} - a^{2}} \qquad 18. \quad \cosh(at) \qquad \frac{s}{s^{2} - a^{2}} \qquad 18. \quad \cosh(at) \qquad \frac{s}{s^{2} - a^{2}} \qquad 18. \quad \cosh(at) \qquad \frac{s^{2} - a^{2}}{(s - a)^{2} + b^{2}}$$

$$18. \quad \cosh(at) \qquad \frac{s}{s^{2} - a^{2}} \qquad 18. \quad \cosh(at) \qquad \frac{s \cos(b) - a\sin(b)}{s^{2} - a^{2}} \qquad 19. \quad e^{st} \sin(bt) \qquad \frac{b}{(s - a)^{2} + b^{2}} \qquad 20. \quad e^{st} \cos(bt) \qquad \frac{s - a}{(s - a)^{2} + b^{2}}$$

$$21. \quad e^{st} \sin(bt) \qquad \frac{b}{(s - a)^{2} - b^{2}} \qquad 22. \quad e^{st} \cosh(bt) \qquad \frac{s - a}{(s - a)^{2} - b^{2}} \qquad 23. \quad t^{s} e^{st}, \quad n = 1, 2, 3, \dots \qquad \frac{n!}{(s - a)^{s+1}} \qquad 24. \quad f(ct) \qquad \frac{1}{c} F(\frac{c}{c}) \qquad 25. \quad u_{s}(t) f(t - c) \qquad e^{-st} F(s) \qquad 28. \quad u_{s}(t) g(t) \qquad e^{-st} \mathcal{L}(s) f(t) \qquad 10. \quad f^{s} f(t) f(t) \qquad 10. \quad f^{s} F(u) du \qquad 20. \quad \int_{0}^{t} f(t) f(t) \qquad f^{s} f(u) du \qquad 10. \quad f^{s} f(t) f(t) \qquad 10. \quad f^{s} f(t) dt \qquad 10. \quad f^{s} f(t) f(t) \qquad 10. \quad f^{s} f(t) f$$