

Table of Common Taylor/Maclaurin Series

$$\begin{aligned}\frac{1}{1-x} &= \sum_{n=0}^{\infty} x^n = 1 + x + x^2 + x^3 + \dots \\ e^x &= \sum_{n=0}^{\infty} \frac{x^n}{n!} = 1 + x + \frac{x^2}{2!} + \frac{x^3}{3!} + \dots \\ \sin(x) &= \sum_{n=0}^{\infty} \frac{(-1)^n x^{2n+1}}{(2n+1)!} = x - \frac{x^3}{3!} + \frac{x^5}{5!} - \dots \\ \cos(x) &= \sum_{n=0}^{\infty} \frac{(-1)^n x^{2n}}{(2n)!} = 1 - \frac{x^2}{2!} + \frac{x^4}{4!} - \dots\end{aligned}$$

Table of Laplace Transforms

| $f(t)$ | $F(s) = \mathcal{L}\{f(t)\}$ | $f(t)$ | $F(s) = \mathcal{L}\{f(t)\}$ |
|--------------------------------|---|--|-----------------------------------|
| 1. (a) $f'(t)$ (b) $f''(t)$ | $sF(s) - f(0)$ $s^2F(s) - sf(0) - f'(0)$ | 11. $e^{at}t^n, n = 1, 2, 3, \dots$ | $\frac{n!}{(s-a)^{n+1}}$ |
| 2. 1 | $\frac{1}{s}$ | 12. $e^{at} \sin(bt)$ | $\frac{b}{(s-a)^2 + b^2}$ |
| 3. e^{at} | $\frac{1}{s-a}$ | 13. $e^{at} \cos(bt)$ | $\frac{s-a}{(s-a)^2 + b^2}$ |
| 4. $t^n, n = 1, 2, 3, \dots$ | $\frac{n!}{s^{n+1}}$ | 14. $t \sin(bt)$ | $\frac{2bs}{(s^2 + b^2)^2}$ |
| 5. $\sin(bt)$ | $\frac{b}{s^2 + b^2}$ | 15. $t \cos(bt)$ | $\frac{s^2 - b^2}{(s^2 + b^2)^2}$ |
| 6. $\cos(bt)$ | $\frac{s}{s^2 + b^2}$ | 16. $f * g$ | $F(s)G(s)$ |
| 7. $\sinh(bt)$ | $\frac{b}{s^2 - b^2}$ | 17. $U(t-a) = u_a(t), a \geq 0$ | $\frac{e^{-as}}{s}$ |
| 8. $\cosh(bt)$ | $\frac{s}{s^2 - b^2}$ | 18. $f(t-a)U(t-a)$ $= f(t-a)u_a(t), a \geq 0$ | $e^{-as}F(s)$ |
| 9. $e^{at}f(t)$ | $F(s-a)$ | 19. $g(t)U(t-a)$ $= g(t)u_a(t), a \geq 0$ | $e^{-as}\mathcal{L}\{g(t+a)\}$ |
| 10. $t^n f(t)$ | $(-1)^n \frac{d^n}{ds^n} F(s)$ | 20. $\delta_a(t) = \delta(t-a), a \geq 0$ | e^{-as} |