Common Laplace Transforms

1. $\mathscr{L}\{t^n\} = \dfrac{n!}{s^{n+1}}$

4. $\mathscr{L}\{e^{at}\} = \dfrac{1}{s-a}$

2. $\mathscr{L}\{\sin kt\} = \dfrac{k}{s^2+k^2}$

5. $\mathscr{L}\{\sinh kt\} = \dfrac{k}{s^2-k^2}$

3. $\mathscr{L}\{\cos kt\} = \dfrac{s}{s^2+k^2}$

6. $\mathscr{L}\{\cosh kt\} = \dfrac{s}{s^2-k^2}$

7. $\mathscr{L}\{y^{(n)}(t)\} = s^n Y(s) - s^{n-1}y(0) - s^{n-2}y'(0) - \cdots - sy^{(n-2)}(0) - y^{(n-1)}(0)$

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

9. $\mathscr{L}\{\mathscr{U}(t-a)\} = \dfrac{e^{-as}}{s}$

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

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

12. $\mathscr{L}\{t^n f(t)\} = (-1)^n \dfrac{d^n}{ds^n}\left[F(s)\right]$

13. $\mathscr{L}\left\{\int_0^t f(\tau)g(t-\tau)\,d\tau\right\} = F(s)G(s)$

14. $\mathscr{L}\left\{\int_0^t f(t)\,dt\right\} = \dfrac{F(s)}{s}$

15. $\mathscr{L}\{f(t)\} = \dfrac{1}{1-e^{-sT}}\int_0^T e^{-st}f(t)\,dt$, where $f(t)$ has period T

16. $\mathscr{L}\{\delta(t)\} = 1$

17. $\mathscr{L}\{\delta(t-t_0)\} = e^{-st_0}$