

## Laplace Transforms Table

| Time space $f(t)$                 | Transform space $F(s)$          |
|-----------------------------------|---------------------------------|
| $f(t) = \mathcal{L}^{-1}\{F(s)\}$ | $F(s) = \mathcal{L}\{f(t)\}$    |
| A. 1                              | $\frac{1}{s}$                   |
| B. $e^{at}$                       | $\frac{1}{s - a}$               |
| C. $t^n, \quad n \in \mathbb{N}$  | $\frac{n!}{s^{n+1}}$            |
| D. $t^p, \quad p > -1$            | $\frac{\Gamma(p + 1)}{s^{p+1}}$ |
| E. $\sin at$                      | $\frac{a}{s^2 + a^2}$           |
| F. $\cos at$                      | $\frac{s}{s^2 + a^2}$           |
| G. $\sinh at$                     | $\frac{a}{s^2 - a^2}$           |
| H. $\cosh at$                     | $\frac{s}{s^2 - a^2}$           |
| I. $e^{at} \sin bt$               | $\frac{b}{(s - a)^2 + b^2}$     |
| J. $e^{at} \cos bt$               | $\frac{s - a}{(s - a)^2 + b^2}$ |

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|---|---|
| $f(t) = \mathcal{L}^{-1}\{F(s)\}$       | $F(s) = \mathcal{L}\{f(t)\}$                        |
| K. $t^n e^{at}, \quad n \in \mathbb{N}$ | $\frac{n!}{(s-a)^{n+1}}$                            |
| L. $u_c(t)f(t-c)$                       | $e^{-cs}F(s)$                                       |
| M. $e^{ct}f(t)$                         | $F(s-c)$  |
| N. $f(ct) \quad c > 0$                  | $\frac{1}{c}F\left(\frac{s}{c}\right)$              |
| O. $\int_0^t f(t-\tau)g(\tau) d\tau$    | $F(s)G(s)$  |
| P. $\delta(t-c)$                        | $e^{-cs}$   |
| $C_1f_1(t) + C_2f_2(t)$                 | $C_1F_1(s) + C_2F_2(s)$                             |
| $f'(t)$                                 | $sF(s) - f(0^+)$                                    |
| $f''(t)$                                | $s^2F(s) - sf(0^+) - f'(0^+)$                       |
| Q. $f^{(n)}(t)$                         | $s^n F(s) - s^{n-1}f(0^+) - \dots - f^{(n-1)}(0^+)$ |
| $tf(t)$                                 | $-F'(s)$  |
| R. $(-t)^n f(t)$                        | $F^{(n)}(s)$  |
| Period T                                | $\frac{F_T(s)}{1 - e^{-sT}}$                        |