

| Função                          | Primitiva                                 | Função                              | Primitiva                         | Função             | Primitiva   |
|---------------------------------|---|-------------------------------------|-----------------------------------|--------------------|---|
| $\frac{u^r u'}{(r \neq -1)}$    | $\frac{u^{r+1}}{r+1}$                     | $\frac{u'}{u}$                      | $\ln  u $                         | $u' e^u$           | $e^u$   |
| $u' a^u$                        | $\frac{a^u}{\ln a}$                       | $u' \cos u$                         | $\sin u$                          | $u' \sin u$        | $-\cos u$   |
| $u' \sec^2 u$                   | $\operatorname{tg} u$                     | $u' \operatorname{cosec}^2 u$       | $-\cotg u$                        | $u' \sec u$        | $\ln  \sec u + \operatorname{tg} u $                          |
| $u' \operatorname{cosec} u$     | $-\ln  \operatorname{cosec} u + \cotg u $ | $\frac{u'}{\sqrt{1-u^2}}$           | $-\arccos u$<br>ou<br>$\arcsen u$ | $\frac{u'}{1+u^2}$ | $\operatorname{arctg} u$<br>ou<br>$-\operatorname{arccotg} u$ |
| $u' \sec u \operatorname{tg} u$ | $\sec u$                                  | $u' \operatorname{cosec} u \cotg u$ | $-\operatorname{cosec} u$         |                    |   |

### Algumas fórmulas trigonométricas

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| $\sec x = \frac{1}{\cos x}$<br>$\operatorname{cosec} x = \frac{1}{\sin x}$<br>$1 + \operatorname{tg}^2 x = \sec^2 x$<br>$1 + \cotg^2 x = \operatorname{cosec}^2 x$ | $\sin(x \pm y) = \sin x \cos y \pm \cos x \sin y$<br>$\cos(x \pm y) = \cos x \cos y \mp \sin x \sin y$<br>$\cos x \cos y = \frac{1}{2}(\cos(x-y) + \cos(x+y))$<br>$\sin x \sin y = \frac{1}{2}(\cos(x-y) - \cos(x+y))$<br>$\sin x \cos y = \frac{1}{2}(\sin(x-y) + \sin(x+y))$ | $\sin(2x) = 2 \sin x \cos x$<br>$\cos(2x) = \cos^2 x - \sin^2 x$<br>$\cos^2 x = \frac{1 + \cos(2x)}{2}$<br>$\sin^2 x = \frac{1 - \cos(2x)}{2}$ |
|--|--|--|

| Função                               | Transformada                         | Função                                | Transformada                           | Função                                | Transformada                         |
|--------------------------------------|--------------------------------------|---------------------------------------|--|---------------------------------------|--------------------------------------|
| $t^n$<br>( $n \in \mathbb{N}_0$ )    | $\frac{n!}{s^{n+1}}$<br>( $s > 0$ )  | $e^{at}$<br>( $a \in \mathbb{R}$ )    | $\frac{1}{s-a}$<br>( $s > a$ )         | $\sin(at)$<br>( $a \in \mathbb{R}$ )  | $\frac{a}{s^2 + a^2}$<br>( $s > 0$ ) |
| $\cos(at)$<br>( $a \in \mathbb{R}$ ) | $\frac{s}{s^2 + a^2}$<br>( $s > 0$ ) | $\sinh(at)$<br>( $a \in \mathbb{R}$ ) | $\frac{a}{s^2 - a^2}$<br>( $s >  a $ ) | $\cosh(at)$<br>( $a \in \mathbb{R}$ ) | $\frac{s}{s^2 - a^2}$<br>$s >  a $   |

### Propriedades da transformada de Laplace

$$F(s) = \mathcal{L}\{f(t)\}(s), \text{ com } s > s_f \quad \text{e} \quad G(s) = \mathcal{L}\{g(t)\}(s), \text{ com } s > s_g$$

|  |   |
|--|---|
| $\mathcal{L}\{f(t) + g(t)\}(s) = F(s) + G(s), \quad s > \max\{s_f, s_g\}$  | $\mathcal{L}\{\alpha f(t)\}(s) = \alpha F(s), \quad s > s_f \text{ e } \alpha \in \mathbb{R}$       |
| $\mathcal{L}\{e^{\lambda t} f(t)\}(s) = F(s - \lambda), \quad s > s_f + \lambda \text{ e } \lambda \in \mathbb{R}$ | $\mathcal{L}\{t^n f(t)\}(s) = (-1)^n F^{(n)}(s), \quad s > s_f \text{ e } n \in \mathbb{N}$         |
| $\mathcal{L}\{H_a(t) \cdot f(t - a)\}(s) = e^{-as} F(s), \quad s > s_f \text{ e } a > 0$                           | $\mathcal{L}\{f(at)\}(s) = \frac{1}{a} F\left(\frac{s}{a}\right), \quad s > a s_f \text{ e } a > 0$ |

$$\mathcal{L}\{f^{(n)}(t)\}(s) = s^n F(s) - s^{n-1} f(0) - s^{n-2} f'(0) - \dots - s f^{(n-2)}(0) - f^{(n-1)}(0)$$

$$\text{com } s > \max\{s_f, s_{f'}, s_{f''}, \dots, s_{f^{(n-1)}}\}, \quad n \in \mathbb{N}$$

$$\mathcal{L}\{(f * g)(t)\}(s) = F(s) \cdot G(s), \quad \text{onde} \quad (f * g)(t) = \int_0^t f(\tau) g(t - \tau) d\tau, \quad t \geq 0$$