FORMULÁRIO

Algumas fórmulas de derivação

$(f\,g)' = f'g + f\,g'$	$\left(\frac{f}{g}\right)' = \frac{f'g - f\,g'}{g^2}$
$(k\,f)' = k\,f' \qquad (k \in \mathbb{R})$	$(f^\alpha)' = \alpha\, f^{\alpha-1} f' \qquad (\alpha \in \mathbb{R})$
$(a^f)' = f'\,a^f\,\ln a \qquad (a \in \mathbb{R}^+)$	$(\log_a f)' = \frac{f'}{f\,\ln a} \qquad (a \in \mathbb{R}^+ \setminus \{1\})$
$(\operatorname{sen} f)' = f'\,\cos f$	$(\cos f)' = -f'\operatorname{sen} f$
$(\operatorname{tg} f)' = f'\,\sec^2 f = \frac{f'}{\cos^2 f}$	$(\operatorname{cotg} f)' = -f'\operatorname{cosec}^2 f = -\frac{f'}{\operatorname{sen}^2 f}$
$(\operatorname{arcsen} f)' = \frac{f'}{\sqrt{1-f^2}}$	$(\arccos f)' = -\frac{f'}{\sqrt{1-f^2}}$
$(\operatorname{arctg} f)' = \frac{f'}{1+f^2}$	$(\operatorname{arccotg} f)' = -\frac{f'}{1+f^2}$

Integração por partes: $\displaystyle\int f'g = f\,g - \int f\,g'$

Alguns desenvolvimentos em série de MacLaurin

- $\displaystyle \frac{1}{1-x} = \sum_{n=0}^{\infty} x^n = 1 + x + x^2 + \cdots + x^n + \cdots, \quad x \in]-1,1[$
- $\displaystyle e^x = \sum_{n=0}^{\infty} \frac{x^n}{n!} = 1 + x + \frac{x^2}{2!} + \cdots + \frac{x^n}{n!} + \cdots, \quad x \in \mathbb{R}$
- $\displaystyle \operatorname{sen} x = \sum_{n=0}^{\infty} (-1)^n \frac{x^{2n+1}}{(2n+1)!} = x - \frac{x^3}{3!} + \cdots + (-1)^n \frac{x^{2n+1}}{(2n+1)!} + \cdots, \quad x \in \mathbb{R}$
- $\displaystyle \cos x = \sum_{n=0}^{\infty} (-1)^n \frac{x^{2n}}{(2n)!} = 1 - \frac{x^2}{2!} + \cdots + (-1)^n \frac{x^{2n}}{(2n)!} + \cdots, \quad x \in \mathbb{R}.$

Algumas transformadas de Laplace

$$F(s) = \mathcal{L}\{f(t)\}(s), \quad s > s_f$$

função	transformada
$t^n \;\; (n \in \mathbb{N}_0)$	$\frac{n!}{s^{n+1}}\,,\; s > 0$
$\mathrm{e}^{at} \;\; (a \in \mathbb{R})$	$\frac{1}{s-a}\,,\; s > a$
$\operatorname{sen}(at) \;\; (a \in \mathbb{R})$	$\frac{a}{s^2+a^2}\,,\; s > 0$
$\cos(at) \;\; (a \in \mathbb{R})$	$\frac{s}{s^2+a^2}\,,\; s > 0$
$\operatorname{senh}(at) \;\; (a \in \mathbb{R})$	$\frac{a}{s^2-a^2}\,,\; s > \lvert a\rvert$
$\cosh(at) \;\; (a \in \mathbb{R})$	$\frac{s}{s^2-a^2}\,,\; s > \lvert a\rvert$

função	transformada
$\mathrm{e}^{\lambda t} f(t) \;\; (\lambda \in \mathbb{R})$	$F(s-\lambda)$
$H_a(t) f(t-a) \;\; (a > 0)$	$e^{-as}F(s)$
$f(at) \;\; (a > 0)$	$\frac{1}{a}\,F\left(\frac{s}{a}\right)$
$t^n f(t) \;\; (n \in \mathbb{N})$	$(-1)^n F^{(n)}(s)$
$f'(t) \;\; (n \in \mathbb{N})$	$sF(s) - f(0)$
$f''(t) \;\; (n \in \mathbb{N})$	$s^2F(s) - sf(0) - f'(0)$
$f^{(n)}(t) \;\; (n \in \mathbb{N})$	$s^nF(s) - \sum_{k=1}^{n} s^{n-k} f^{(k-1)}(0)$