Universidade do Minho
Departamento de Matemática

LEInf

Cálculo para Engenharia

Formulário — 2023'24

Funções transcendentais

Omite-se o domínio das funções.

$$\operatorname{sen}^2 x + \cos^2 x = 1$$

$$1 + \operatorname{tg}^2 x = \frac{1}{\cos^2 x}$$

$$1 + \operatorname{cotg}^2 x = \frac{1}{\operatorname{sen}^2 x}$$

$\operatorname{sen}(-x) = -\operatorname{sen} x$ (a função é ímpar)

$\cos(-x) = \cos x$ (a função é par)

$$\operatorname{sen}(x+y) = \operatorname{sen} x \cos y + \operatorname{sen} y \cos x$$

$$\cos(x+y) = \cos x \cos y - \operatorname{sen} y \operatorname{sen} x$$

$$\operatorname{sen} x - \operatorname{sen} y = 2 \operatorname{sen} \tfrac{x-y}{2} \cos \tfrac{x+y}{2}$$

$$\cos x - \cos y = -2 \operatorname{sen} \tfrac{x-y}{2} \operatorname{sen} \tfrac{x+y}{2}$$

$$\operatorname{sen}^2 x = \frac{1 - \cos 2x}{2}$$

$$\cos^2 x = \frac{1 + \cos 2x}{2}$$

$$\operatorname{sen}(\arccos x) = \sqrt{1-x^2}$$

$$\operatorname{tg}(\arccos x) = \frac{\sqrt{1-x^2}}{x}$$

$$\operatorname{senh} x = \frac{e^x - e^{-x}}{2}$$

$$\cosh x = \frac{e^x + e^{-x}}{2}$$

$$\cosh^2 x - \operatorname{senh}^2 x = 1$$

$$\cosh x + \operatorname{senh} x = e^x$$

$$\operatorname{tgh}^2 x + \frac{1}{\cosh^2 x} = 1$$

$$\operatorname{cotgh}^2 x - \frac{1}{\operatorname{senh}^2 x} = 1$$

$\operatorname{senh}(-x) = -\operatorname{senh} x$ (a função é ímpar)

$\cosh(-x) = \cosh x$ (a função é par)

$$\operatorname{senh}(x+y) = \operatorname{senh} x \cosh y + \operatorname{senh} y \cosh x$$

$$\cosh(x+y) = \cosh x \cosh y + \operatorname{senh} y \operatorname{senh} x$$

$$\cos(\operatorname{arcsen} x) = \sqrt{1-x^2}$$

$$\operatorname{tg}(\operatorname{arcsen} x) = \frac{x}{\sqrt{1-x^2}}$$

x	0	$\frac{\pi}{6}$	$\frac{\pi}{4}$	$\frac{\pi}{3}$	$\frac{\pi}{2}$
$\operatorname{sen} x$	0	$\frac{1}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{\sqrt{3}}{2}$	1
$\cos x$	1	$\frac{\sqrt{3}}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{1}{2}$	0

Tabela de derivadas

Omite-se o domínio das funções e considera-se a uma constante.

$$(f \pm g)'(x) = f'(x) \pm g'(x)$$

$$(f\, g)'(x) = f'(x)\, g(x) + f(x)\, g'(x)$$

$$\left(\frac{f}{g}\right)'(x) = \frac{f'(x)\, g(x) - f(x)\, g'(x)}{g^2(x)}$$

$$(f^{-1})'(y) = \frac{1}{f'(f^{-1}(y))}$$

$$(f \circ u)'(x) = f'(u(x))\, u'(x)$$

$$(x^a)' = a\, x^{a-1}$$

$$a' = 0$$

$$(a^x)' = a^x \ln a$$

$$\log_a' x = \frac{1}{x \ln a}$$

$$(e^x)' = e^x$$

$$(\ln x)' = \frac{1}{x}$$

$$\operatorname{sen}' x = \cos x$$

$$\cos' x = -\operatorname{sen} x$$

$$\operatorname{tg}' x = \sec^2 x$$

$$\operatorname{cotg}' x = -\operatorname{cosec}^2 x$$

$$\sec' x = \sec x \operatorname{tg} x$$

$$\operatorname{cosec}' x = -\operatorname{cosec} x \operatorname{cotg} x$$

$$\operatorname{senh}' x = \cosh x$$

$$\cosh' x = \operatorname{senh} x$$

$$\operatorname{tgh}' x = \operatorname{sech}^2 x$$

$$\operatorname{cotgh}' x = -\operatorname{cosech}^2 x$$

$$\operatorname{sech}' x = -\operatorname{sech} x \operatorname{tgh} x$$

$$\operatorname{cosech}' x = -\operatorname{cosech} x \operatorname{cotgh} x$$

$$\operatorname{arcsen}' x = \frac{1}{\sqrt{1-x^2}}$$

$$\arccos' x = \frac{-1}{\sqrt{1-x^2}}$$

$$\operatorname{arctg}' x = \frac{1}{1+x^2}$$

$$\operatorname{arccotg}' x = \frac{-1}{1+x^2}$$

$$\operatorname{arcsec}' x = \frac{1}{x\sqrt{x^2-1}}$$

$$\operatorname{arccosec}' x = \frac{-1}{x\sqrt{x^2-1}}$$

$$\operatorname{argsenh}' x = \frac{1}{\sqrt{1+x^2}}$$

$$\operatorname{argcosh}' x = \frac{1}{\sqrt{x^2-1}}$$

$$\operatorname{argtgh}' x = \frac{1}{1-x^2}$$

$$\operatorname{argcotgh}' x = \frac{1}{1-x^2}$$

$$\operatorname{argsech}' x = \frac{-1}{x\sqrt{1-x^2}}$$

$$\operatorname{argcosech}' x = \frac{-1}{x\sqrt{1+x^2}}$$