Cálculo

Formulário 1 — 2020'21

Funções importantes

(Omitem-se os domínios das funções.)

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

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

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

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

$$\cos(-x) = \cos x \quad \text{(a função é par)}$$

$$\operatorname{sen}(\tfrac{\pi}{2} - x) = \cos x$$

$$\cos(\tfrac{\pi}{2} - x) = \operatorname{sen} x$$

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

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

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

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

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

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

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

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

$$\operatorname{ch}^2 x - \operatorname{sh}^2 x = 1$$

$$\operatorname{ch} x + \operatorname{sh} x = e^x$$

$$\operatorname{th}^2 x + \frac{1}{\operatorname{ch}^2 x} = 1$$

$$\operatorname{coth}^2 x - \frac{1}{\operatorname{sh}^2 x} = 1$$

$$\operatorname{sh}(-x) = -\operatorname{sh} x \quad \text{(a função é ímpar)}$$

$$\operatorname{ch}(-x) = \operatorname{ch} x \quad \text{(a função é par)}$$

$$\operatorname{sh}(x+y) = \operatorname{sh} x \operatorname{ch} y + \operatorname{sh} y \operatorname{ch} x$$

$$\operatorname{ch}(x+y) = \operatorname{ch} x \operatorname{ch} y + \operatorname{sh} y \operatorname{sh} x$$

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

Cálculo

Regras de derivação

(Omitem-se os domínios das funções e considera-se a uma constante apropriada.)

$$a' = 0$$

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

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

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

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

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

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

$$\operatorname{sh}' x = \operatorname{ch} x$$

$$\operatorname{th}' x = \frac{1}{\operatorname{ch}^2 x}$$

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

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

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

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

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

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

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

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

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

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

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

$$\operatorname{ch}' x = \operatorname{sh} x$$

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

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

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

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

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

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

Cálculo

Formulário 3 — 2020'21

Primitivas Imediatas

($u\colon I \longrightarrow \mathbb{R}$ é uma função derivável num intervalo I e $\mathcal{C}$ denota uma constante real arbitrária)

$\int a\,dx = ax + \mathcal{C}$	$\int u'\,u^{\alpha}\;dx = \dfrac{u^{\alpha+1}}{\alpha+1} + \mathcal{C}\;\;(\alpha \neq -1)$
$\int \dfrac{u'}{u}\,dx = \ln\lvert u\rvert + \mathcal{C}$	$\int u'\,a^{u}\;dx = \dfrac{a^{u}}{\ln a} + \mathcal{C}\;\;(a \in \mathbb{R}^{+}\setminus\{1\})$
$\int u'\;\cos u\;dx = \operatorname{sen} u + \mathcal{C}$	$\int u'\;\operatorname{sen} u\;dx = -\cos u + \mathcal{C}$
$\int u'\;\operatorname{tg} u\;dx = -\ln\lvert\cos u\rvert + \mathcal{C}$	$\int u'\;\operatorname{cotg} u\;dx = \ln\lvert\operatorname{sen} u\rvert + \mathcal{C}$
$\int \dfrac{u'}{\cos^2 u}\;dx = \operatorname{tg} u + \mathcal{C}$	$\int \dfrac{u'}{\operatorname{sen}^2 u}\;dx = -\operatorname{cotg} u + \mathcal{C}$
$\int \dfrac{u'}{\sqrt{1-u^2}}\,dx = \operatorname{arcsen} u + \mathcal{C}$	$\int \dfrac{-u'}{\sqrt{1-u^2}}\,dx = \arccos u + \mathcal{C}$
$\int \dfrac{u'}{1+u^2}\,dx = \operatorname{arctg} u + \mathcal{C}$	$\int \dfrac{-u'}{1+u^2}\,dx = \operatorname{arccotg} u + \mathcal{C}$
$\int u'\;\operatorname{ch} u\;dx = \operatorname{sh} u + \mathcal{C}$	$\int u'\;\operatorname{sh} u\;dx = \operatorname{ch} u + \mathcal{C}$
$\int u'\;\operatorname{th} u\;dx = \ln(\operatorname{ch} u) + \mathcal{C}$	$\int u'\;\operatorname{coth} u\;dx = \ln\lvert\operatorname{sh} u\rvert + \mathcal{C}$
$\int \dfrac{u'}{\operatorname{ch}^2 u}\;dx = \operatorname{th} u + \mathcal{C}$	$\int \dfrac{u'}{\operatorname{sh}^2 u}\;dx = -\operatorname{coth} u + \mathcal{C}$
$\int \dfrac{u'}{\sqrt{u^2+1}}\,dx = \operatorname{argsh} u + \mathcal{C}$	$\int \dfrac{u'}{\sqrt{u^2-1}}\,dx = \operatorname{argch} u + \mathcal{C}$
$\int \dfrac{u'}{1-u^2}\,dx = \operatorname{argth} u + \mathcal{C}$	$\int \dfrac{u'}{1-u^2}\,dx = \operatorname{argcoth} u + \mathcal{C}$