UNIVERSIDADE BEIRA INTERIOR

Departamento de Matemática

1º Ciclo em Engenharia Informática

Ano Lectivo 2020/2021

Cálculo I

Formulário

x	0	$\frac{\pi}{6}$	$\frac{\pi}{4}$	$\frac{\pi}{3}$	$\frac{\pi}{2}$	π	$\frac{3\pi}{2}$
$\operatorname{sen} x$	0	$\frac{1}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{\sqrt{3}}{2}$	1	0	-1
$\cos x$	1	$\frac{\sqrt{3}}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{1}{2}$	0	-1	0
$\operatorname{tg} x$	0	$\frac{\sqrt{3}}{3}$	1	$\sqrt{3}$	–	0	–
$\operatorname{cotg} x$	–	$\sqrt{3}$	1	$\frac{\sqrt{3}}{3}$	0	–	0

$$\operatorname{sen}^2\theta + \cos^2\theta = 1 \qquad \operatorname{tg}\theta = \frac{\operatorname{sen}\theta}{\cos\theta}$$

$$1 + \operatorname{tg}^2\theta = \frac{1}{\cos^2\theta} \qquad \operatorname{sen}\left(\frac{\pi}{2} - \theta\right) = \cos\theta$$

$$\operatorname{sen}(-\theta) = -\operatorname{sen}\theta \qquad \cos\left(\frac{\pi}{2} - \theta\right) = \operatorname{sen}\theta$$

$$\cos(-\theta) = \cos\theta \qquad \operatorname{tg}\left(\frac{\pi}{2} - \theta\right) = \operatorname{cotg}\theta$$

$$\operatorname{sen}(\alpha \pm \beta) = \operatorname{sen}\alpha\cos\beta \pm \cos\alpha\operatorname{sen}\beta \qquad \operatorname{sen}(2\theta) = 2\operatorname{sen}\theta\cos\theta \qquad \operatorname{sen}(\theta/2) = \pm\sqrt{\frac{1-\cos\theta}{2}}$$

$$\cos(\alpha \pm \beta) = \cos\alpha\cos\beta \mp \operatorname{sen}\alpha\operatorname{sen}\beta \qquad \cos(2\theta) = \cos^2\theta - \operatorname{sen}^2\theta \qquad \cos(\theta/2) = \pm\sqrt{\frac{1+\cos\theta}{2}}$$

$$\operatorname{tg}(\alpha \pm \beta) = \frac{\operatorname{tg}\alpha \pm \operatorname{tg}\beta}{1 \mp \operatorname{tg}\alpha\operatorname{tg}\beta} \qquad \operatorname{tg}(2\theta) = \frac{2\operatorname{tg}\theta}{1 - \operatorname{tg}^2\theta} \qquad \operatorname{tg}(\theta/2) = \pm\sqrt{\frac{1-\cos\theta}{1+\cos\theta}}$$

$$\operatorname{sen}\alpha + \operatorname{sen}\beta = 2\operatorname{sen}\frac{\alpha+\beta}{2}\cos\frac{\alpha-\beta}{2} \qquad \operatorname{sen}\alpha - \operatorname{sen}\beta = 2\operatorname{sen}\frac{\alpha-\beta}{2}\cos\frac{\alpha+\beta}{2}$$

$$\cos\alpha + \cos\beta = 2\cos\frac{\alpha+\beta}{2}\cos\frac{\alpha-\beta}{2} \qquad \cos\alpha - \cos\beta = -2\operatorname{sen}\frac{\alpha+\beta}{2}\operatorname{sen}\frac{\alpha-\beta}{2}$$

$$\lim_{x\to+\infty}\left(1 + \frac{\alpha}{x}\right)^x = \mathrm{e}^\alpha \qquad \lim_{x\to 0}\frac{\operatorname{sen} x}{x} = 1 \qquad \lim_{x\to 0}\frac{\mathrm{e}^x - 1}{x} = 1$$

$$\alpha' = 0 \qquad (\alpha u)' = \alpha u' \qquad (u+v)' = u' + v'$$

$$(uv)' = u'v + uv' \qquad (u^\alpha)' = \alpha u^{\alpha-1}u' \qquad \left(\frac{u}{v}\right)' = \frac{u'v - uv'}{v^2}$$

$$(\mathrm{e}^u)' = u'\,\mathrm{e}^u \qquad (\alpha^u)' = u'\alpha^u\ln a \qquad (u^v)' = v'u^v\ln u + vu^{v-1}u'$$

$$(\operatorname{senh} u)' = u'\cosh u \qquad (\cosh u)' = u'\operatorname{senh} u \qquad (\ln u)' = \frac{u'}{u}$$

$$(\log_\alpha u)' = \frac{u'}{u\ln\alpha} \qquad (\operatorname{sen} u)' = u'\cos u \qquad (\cos u)' = -u'\operatorname{sen} u$$

$$(\operatorname{tg} u)' = \frac{u'}{\cos^2 u} \qquad (\operatorname{cotg} u)' = -\frac{u'}{\operatorname{sen}^2 u} \qquad (\operatorname{arcsen} u)' = \frac{u'}{\sqrt{1-u^2}}$$

$$(\arccos u)' = -\frac{u'}{\sqrt{1-u^2}} \qquad (\operatorname{arctg} u)' = \frac{u'}{1+u^2} \qquad (\operatorname{arccotg} u)' = -\frac{u'}{1+u^2}$$

$$\int \alpha\, dx = \alpha x + C$$

$$\int u' u^{\alpha}\, dx = \frac{u^{\alpha+1}}{\alpha+1} + C, \qquad \alpha \neq -1$$

$$\int \frac{u'}{u}\, dx = \ln|u| + C$$

$$\int u' a^{u}\, dx = \frac{a^{u}}{\ln a} + C, \qquad a \in \mathbb{R}^{+} \setminus \{1\}$$

$$\int u' e^{u}\, dx = e^{u} + C$$

$$\int u' \cos u\, dx = \operatorname{sen} u + C$$

$$\int u' \operatorname{sen} u\, dx = -\cos u + C$$

$$\int \frac{u'}{\cos^2 u}\, dx = \operatorname{tg} u + C$$

$$\int \frac{u'}{\operatorname{sen}^2 u}\, dx = -\operatorname{cotg} u + C$$

$$\int \frac{u'}{\sqrt{1-u^2}}\, dx = \operatorname{arcsen} u + C$$

$$\int \frac{u'}{1+u^2}\, dx = \operatorname{arctg} u + C$$

$$\int u' \operatorname{senh} u\, dx = \cosh u + C$$

$$\int u' \cosh u\, dx = \operatorname{senh} u + C$$

$$\int u'(x)v(x)\ dx = u(x)v(x) - \int u(x)v'(x)\ dx$$

$$\int f(x)\ dx = \int f(\varphi(t))\varphi'(t)\, dt$$

$$\int u(x)v(x)\ dx = U(x)\ v(x) - \int U(x)\ v'(x)\ dx, \quad \text{onde} \quad U(x) = \int u(x)\, dx$$

$$\int_a^b u'(x)v(x)\ dx = [u(x)v(x)]_a^b - \int_a^b u(x)v'(x)\ dx$$

$$\int_a^b f(x)\ dx = \int_{\varphi^{-1}(a)}^{\varphi^{-1}(b)} f(\varphi(t))\varphi'(t)\, dt$$

$$\int_a^b u(x)v(x)\ dx = [U(x)v(x)]_a^b - \int_a^b U(x)v'(x)\ dx, \quad \text{onde} \quad U(x) = \int u(x)\, dx$$

$$V = \pi \int_a^b [f(x)]^2\, dx \qquad \ell = \int_a^b \sqrt{1+[f'(x)]^2}\, dx \qquad A = 2\pi \int_a^b f(x)\sqrt{1+[f'(x)]^2}\, dx$$