Formulário

Considerando que u é uma função real de variável real x e que $a,\ \alpha,\ \beta \in \mathbb{R}$ tem-se

$$\frac{d}{dx}\left(\frac{u^{\alpha+1}}{\alpha+1}\right)=u^{\alpha}\frac{du}{dx}\ (\alpha\neq-1) \qquad \frac{d}{dx}\log_a u=\frac{\log_a e}{u}\frac{du}{dx}\ (\alpha\neq 0,\alpha\neq 1) \qquad \frac{d}{dx}\left(\frac{a^u}{\ln a}\right)=a^u\frac{du}{dx}$$

$$\frac{d}{dx}e^u=e^u\frac{du}{dx} \qquad \frac{d}{dx}u^v=\frac{d}{dx}e^{v\ln u}=e^{v\ln u}\frac{d}{dx}(v\ln u) \qquad \frac{d}{dx}\cos u=-\operatorname{sen}u\frac{du}{dx}$$

$$\frac{d}{dx}\operatorname{sen}u=\cos u\frac{du}{dx} \qquad \frac{d}{dx}\operatorname{tg}u=\sec^2 u\frac{du}{dx} \qquad \frac{d}{dx}\operatorname{cotg}u=-\operatorname{cosec}^2 u\frac{du}{dx}$$

$$\frac{d}{dx}\sec u=\sec u\operatorname{tg}u\frac{du}{dx} \qquad \frac{d}{dx}\operatorname{cosec}u=-\operatorname{cosec}u\operatorname{cotg}u\frac{du}{dx} \qquad \frac{d}{dx}(\arccos u)=-\frac{1}{\sqrt{1-u^2}}\frac{du}{dx}$$

$$\frac{d}{dx}(\operatorname{arcsen}u)=\frac{1}{\sqrt{1-u^2}}\frac{du}{dx} \qquad \frac{d}{dx}(\operatorname{arctg}u)=\frac{1}{1+u^2}\frac{du}{dx} \qquad \frac{d}{dx}(\operatorname{arccotg}u)=-\frac{1}{1+u^2}\frac{du}{dx}$$

$$\frac{d}{dx}(\operatorname{arcsec}u)=\frac{1}{|u|\sqrt{u^2-1}}\frac{du}{dx} \qquad \frac{d}{dx}(\operatorname{arccosec}u)=-\frac{1}{|u|\sqrt{u^2-1}}\frac{du}{dx} \qquad \frac{d}{dx}\operatorname{ch}u=\operatorname{sh}u\frac{du}{dx}$$

$$\frac{d}{dx}\operatorname{sh}u=\operatorname{ch}u\frac{du}{dx} \qquad \frac{d}{dx}\operatorname{th}u=\operatorname{sech}^2 u\frac{du}{dx} \qquad \frac{d}{dx}\coth u=-\operatorname{cosech}^2 u\frac{du}{dx}$$

$$\frac{d}{dx}\operatorname{sech}u=-\operatorname{sech}u\operatorname{th}u\frac{du}{dx} \qquad \frac{d}{dx}\operatorname{cosech}u=-\operatorname{cosech}u\coth u\frac{du}{dx}$$

$$\frac{d}{dx}(\operatorname{argsh}u)=\frac{1}{\sqrt{1+u^2}}\frac{du}{dx} \qquad \frac{d}{dx}(\operatorname{argth}u)=\frac{1}{1-u^2}\frac{du}{dx} \qquad \frac{d}{dx}(\arg\coth u)=\frac{1}{1-u^2}\frac{du}{dx}$$

$$\frac{d}{dx}(\operatorname{argch}u)=\frac{\pm1}{\sqrt{u^2-1}}\frac{du}{dx} \qquad \frac{d}{dx}(\operatorname{argsech}u)=\frac{\mp1}{u\sqrt{1-u^2}}\frac{du}{dx} \qquad \frac{d}{dx}(\operatorname{argcosech}u)=\frac{\mp1}{u\sqrt{1+u^2}}\frac{du}{dx}$$

$-$se $\operatorname{argch}u<0$, $+$se $\operatorname{argch}u>0$ $\qquad$ $-$se $\operatorname{argsech}u>0$, $+$se $\operatorname{argsech}u<0$ $\qquad$ $-$ se $u>0$, $+$ se $u<0$

Mudança de variável aconselhada para algumas funções:

$R\left(x,\sqrt{a^2-x^2}\right)dx \quad (x=a\operatorname{sen}t)$ $\qquad$ $R\left(x,\sqrt{a^2+x^2}\right)dx \quad (x=a\operatorname{sh}t)$ $\qquad$ $R\left(x,\sqrt{x^2-a^2}\right)dx \quad (x=a\sec t)$

$R(x,\log_a x)\,dx \quad (t=\log_a x)$

$R(x,a^{rx},a^{sx},...)\,dx \quad (t=a^{mx})$ $\qquad$ $R\left[x,\ (ax+b)^{\frac{p}{q}},\ (ax+b)^{\frac{r}{s}},...\right]dx$ $\qquad$ $R(x,\operatorname{sen}x,\cos x)\,dx \quad \left(t=\operatorname{tg}\frac{x}{2}\right)$

nota: $m=mdc\,(r,s,...)$ $\qquad$ $\left[(ax+b)^{\frac{1}{m}}=t\right]\quad m=mmc\,(q,s,...)$ $\qquad$ nota: $\cos x=\frac{1-t^2}{1+t^2}$ e $\operatorname{sen}x=\frac{2t^2}{1+t^2}$

Algumas fórmulas trignométricas:

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

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

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

Algumas fórmulas relevantes

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

$$\operatorname{sh}u=\frac{e^u-e^{-u}}{2} \qquad \operatorname{ch}\frac{u}{2}=\pm\sqrt{\frac{\operatorname{ch}u+1}{2}} \qquad \operatorname{ch}(u\pm v)=\operatorname{ch}u\operatorname{ch}v\pm\operatorname{sh}u\operatorname{sh}v$$

$$\operatorname{th}u=\frac{\operatorname{sh}u}{\operatorname{ch}u} \qquad \coth u=\frac{1}{\operatorname{th}u} \qquad \operatorname{sh}\frac{u}{2}=\pm\sqrt{\frac{\operatorname{ch}u-1}{2}} \qquad \operatorname{sh}(u\pm v)=\operatorname{sh}u\operatorname{ch}v\pm\operatorname{sh}v\operatorname{ch}u$$

$$\operatorname{ch}^2u-\operatorname{sh}^2u=1 \qquad \operatorname{th}\frac{u}{2}=\pm\sqrt{\frac{\operatorname{ch}u-1}{\operatorname{ch}u+1}}=\frac{\operatorname{sh}u}{\operatorname{ch}u+1} \qquad \operatorname{th}(u\pm v)=\frac{\operatorname{th}u\pm\operatorname{th}v}{1\pm\operatorname{th}u\operatorname{th}v}$$

Volume

$$V_{OX} = \pi \int_a^b \left(f(x)^2 - g(x)^2 \right) \, dx$$

Área em coord. polares

$$A = \frac{1}{2} \int_{\theta_1}^{\theta^2} f(\theta)^2 d\theta$$

Comprimento de arco

$$\begin{aligned} C &= \int_a^b \sqrt{1 + f'(x)^2} \, dx \\ C &= \int_{t_0}^{t_1} \sqrt{x'(t)^2 + y'(t)^2} \, dx \quad \text{(coords. paramétricas)} \end{aligned}$$

Área da superfície de revolução

$$\begin{aligned} S_{OX} &= 2\pi \int_a^b |f(x)| \sqrt{1 + f'(x)^2} \, dx \\ S_{OY} &= 2\pi \int_a^b |x| \sqrt{1 + f'(x)^2} \, dx \end{aligned}$$