Differentialquotienten

$$y = x^{\alpha} \qquad \frac{dy}{dx} = \alpha x^{\alpha-1} \qquad y = \sin x \qquad y' = \cos x \qquad \text{(D-1)}$$

$$y = b^{x} \qquad \frac{dy}{dx} = b^{x} \ln b \qquad y = \cos x \qquad y' = -\sin x \qquad \text{(D-2)}$$

$$y = e^{x} \quad y' = e^{x} \qquad y = \cosh x = \frac{e^{x} + e^{-x}}{2} \qquad y' = \sinh x \qquad \text{(D-3)}$$

$$y = \log_{b} x \qquad y' = \frac{\log_{b} e}{x} \qquad y = \sinh x \qquad y' = \cosh x \qquad \text{(D-4)}$$

$$y = \ln x \qquad y' = \frac{1}{x} \qquad \text{(D-5)}$$

Product: $$\frac{d\left(u \cdot v\right)}{dx} = u \cdot \frac{dv}{dx} + v\left[\cdot\right]\frac{du}{dx} \qquad \text{(D-6)}$$

Quotient: $$\frac{\mathrm{d}}{\mathrm{dx}}\left(\frac{u}{v}\right) = \frac{v\left[\cdot\right]\mathrm{d}u - u\left[\cdot\right]\mathrm{d}v}{v^{2}} \qquad \text{(D-7)}$$

$$\frac{d\,\mathrm{tg}\,x}{dx} = 1 + \mathrm{tg}^{2}\,x \qquad \text{(D-8)}$$

$$\frac{d\,\mathrm{ctg}\,x}{dx} = -\left(1 + \cot^{2} x\right) \qquad \text{(D-9)}$$

$$\frac{d\sec x}{dx} = \mathrm{tg}\,x \cdot \sec x \qquad \text{(D-10)}$$

$$\frac{d\,\mathrm{cosec}\,x}{dx} = -\cot x \cdot \mathrm{cosec} \cdot x \qquad \text{(D-11)}$$

$$\frac{d \arcsin x}{dx} = \frac{1}{\sqrt{1 - x^{2}}} \qquad \text{(D-12)}$$

$$\frac{d \arccos x}{dx} = -\frac{1}{\sqrt{1 - x^{2}}} \qquad \text{(D-13)}$$

$$\frac{d\,\mathrm{arctg}\,x}{dx}=\frac{1}{1+x^2} \tag{D-14}$$

$$\frac{d\,\mathrm{arcot}\,x}{dx}=-\frac{1}{1+x^2} \tag{D-15}$$

$$\frac{d\,\mathrm{arcsec}\,x}{dx}=\frac{1}{x\sqrt{x^2-1}} \tag{D-16}$$

$$\frac{d\,\mathrm{arcosec}\,x}{dx}=-\frac{1}{x\sqrt{x^2-1}} \tag{D-17}$$

Differentialquotienten

Allgemein: Bogenfunctionen

1. $$\frac{d\,\mathrm{arcsin}\,\varphi(x)}{dx}=\frac{\varphi'(x)}{\sqrt{1-\varphi(x)^2}} \tag{D-18}$$

2. $$\frac{d\,\mathrm{arccos}\,\varphi(x)}{dx}=\frac{-\varphi'(x)}{\sqrt{1+\varphi(x)^2}} \tag{D-19}$$

3. $$\frac{d\,\mathrm{arctg}\,\varphi(x)}{dx}=\frac{\varphi'(x)}{1+(\varphi(x))^2} \tag{D-20}$$

4. $$\frac{d\,\mathrm{arccot}\cdot\varphi(x)}{dx}=-\frac{\varphi'(x)}{1+(\varphi(x))^2} \tag{D-21}$$

5. $$\frac{d\,\mathrm{arcsec}\,\varphi(x)}{dx}=\frac{\varphi'(x)}{\varphi(x)\sqrt{(\varphi(x))^2-1}} \tag{D-22}$$

6. $$\frac{d\,\mathrm{arcosec}\,\varphi(x)}{dx}=-\frac{\varphi'(x)}{\varphi(x)\sqrt{[\varphi(x)]^2-1}} \tag{D-23}$$

Logarithm. Function: $$\frac{d}{dx}\lg\varphi(x)=\frac{\varphi'(x)}{\varphi(x)} \tag{D-24}$$

Funct. von Funct. $\dfrac{dz}{dx}=\dfrac{dz}{dy}\cdot\dfrac{dy}{dx}$ z. B.

$$d\left[\frac{1}{b}\ln(a+bx)\right]=\frac{dx}{a+bx} \qquad d\left[\frac{2\sqrt{a+bx}}{b}\right]=\frac{dx}{\sqrt{a+bx}} \tag{D-25}$$

$$d\left[-\frac{1}{b(a+bx)}\right]=\frac{dx}{(a+bx)^2} \qquad d\left[\frac{\ln\left(\beta x+\sqrt{\alpha^2+\beta^2x^2}\right)}{\beta}\right]=\frac{dx}{\sqrt{\alpha^2+\beta^2x^2}}$$

(D-26)

$$d\left[\frac{1}{\alpha\cdot\beta}\operatorname{arctg}\frac{\beta x}{\alpha}\right]=\frac{dx}{\alpha^2+\beta^2x^2} \qquad d\left[\frac{1}{\beta}\arcsin\frac{\beta x}{\alpha}\right]=\frac{dx}{\sqrt{\alpha^2-\beta^2x^2}} \tag{D-27}$$

$$d\left[\frac{1}{2\alpha\beta}\ln\left(\frac{\alpha+\beta x}{\alpha-\beta x}\right)\right]=\frac{dx}{\alpha^2-\beta^2x^2} \qquad d\left[\frac{\sqrt{a+bx^2}}{b}\right]=\frac{xdx}{\sqrt{a+bx^2}} \tag{D-28}$$

$$d\left[\frac{1}{2b}\ln\left(a+bx^2\right)\right]=\frac{xdx}{a+bx^2} \tag{D-29}$$

$$d\left[\frac{x}{a\sqrt{a+bx^2}}\right]=\frac{dx}{\sqrt{\left(a+bx^2\right)^3}} \qquad d\left[-\frac{1}{b\sqrt{a+bx^2}}\right]=\frac{xdx}{\sqrt{\left(a+bx^2\right)^3}} \tag{D-30}$$

$$d[x\ln x-x]=\ln x\,dx \qquad d[-\ln\cos u]=\operatorname{tg}u\,du \tag{D-31}$$

$$d[\ln\sin u]=\cot u\,du \qquad d\left[\frac{1}{\alpha\beta}\operatorname{arctg}\left(\frac{\beta\operatorname{tg}u}{\alpha}\right)\right]=\frac{du}{\alpha^2\cos^2u+\beta^2\sin^2u}$$

(D-32)

$$d\left[\frac{1}{2\alpha\beta}\ln\left(\frac{\alpha+\beta\operatorname{tg}u}{\alpha-\beta\operatorname{tg}u}\right)\right]=\frac{du}{\alpha^2\cos^2u-\beta^2\sin^2u} \tag{D-33}$$