MATEUSZ KOWALSKI

Pochodne funkcji

Algebraicznych

- $[x]' = 1$
- $[x^n]' = nx^{n-1}$
- $\left[\frac{1}{x}\right]' = \frac{-1}{x^2}$
- $\left[\frac{1}{x^n}\right]' = \frac{-n}{x^{n+1}}$
- $[\sqrt{x}]' = \frac{1}{2\sqrt{x}}$
- $[c]' = 0$

Trygonometrycznych

- $[\sin x]' = \cos x$
- $[\cos x]' = -\sin x$
- $[\operatorname{tg} x]' = \frac{1}{\cos^2 x}$
- $[\operatorname{ctg} x]' = \frac{-1}{\sin^2 x}$

Wykładniczych i logarytmicznych

- $[\ln x]' = \frac{1}{x}$
- $[\ln |x|]' = \frac{1}{x}$
- $[\log_a |x|]' = \frac{1}{x \ln a}$
- $[\log_a x]' = \frac{1}{x \ln a}$
- $[e^x]' = e^x$
- $[a^x]' = a^x \ln a$

Cyklometrycznych

- $[\operatorname{arcsin} x]' = \frac{1}{\sqrt{1-x^2}}$
- $[\operatorname{arccos} x]' = \frac{-1}{\sqrt{1-x^2}}$
- $[\operatorname{arctg} x]' = \frac{1}{1+x^2}$
- $[\operatorname{arcctg} x]' = \frac{-1}{1+x^2}$

Polowych

- $[\operatorname{arcosh}_1 x]' = \frac{1}{\sqrt{x^2-1}}$
- $[\operatorname{arcosh}_2 x]' = \frac{-1}{\sqrt{x^2-1}}$
- $[\operatorname{arsinh} x]' = \frac{1}{\sqrt{1+x^2}}$
- $[\operatorname{artgh} x]' = \frac{1}{1-x^2}$
- $[\operatorname{arctgh} x]' = \frac{1}{1-x^2}$

Hiperbolicznych

- $[\sinh x]' = \cosh x$
- $[\cosh x]' = \sinh x$
- $[\operatorname{tgh} x]' = \frac{1}{\cosh^2 x}$
- $[\operatorname{ctgh} x]' = \frac{-1}{\sinh^2 x}$

- $f(x)^{g(x)} = e^{g(x)\ln f(x)}$
- $[x^x]' = x^x\,(1+\ln x)$

Własności pochodnych

- $[c \cdot f(x)]' = c \cdot f'(x)$
- $[g(f(x))]' = g'(f(x)) \cdot f'(x)$
- $[f(x)+g(x)]' = f'(x)+g'(x)$
- $[f(x)\cdot g(x)]' = f'(x)g(x) + f(x)g'(x)$
- $[f(x)-g(x)]' = f'(x)-g'(x)$
- $\left[\frac{f(x)}{g(x)}\right]' = \frac{f'(x)g(x) - f(x)g'(x)}{(g(x))^2}$
- $[f(x)g(x)h(x)]' = f'(x)g(x)h(x) + f(x)g'(x)h(x) + f(x)g(x)h'(x)$

$$\left[f(x)^{g(x)}\right]' = f(x)^{g(x)-1}\left(f'(x)g(x) + f(x)g'(x)\ln f(x)\right)$$

$$\begin{matrix} x(t) \\ y(t) \end{matrix} \quad \Rightarrow \quad \frac{\mathrm{d}y}{\mathrm{d}x} = \frac{y'(t)}{x'(t)} \quad \Rightarrow \quad \frac{\mathrm{d}^2y}{\mathrm{d}x^2} = \frac{y''(t)x'(t) - y'(t)x''(t)}{(x'(t))^3}$$