∇

$$\lim_{x\to\infty} \frac{x^2+3x+5}{x+4} \overset{\frac{\infty}{\infty}}{=} \infty$$

$$\lim_{x\to\infty} \frac{x+5}{x^3+4x+2} \overset{\frac{\infty}{\infty}}{=} 0$$

0

$$\lim_{x\to\infty} \frac{3x^2+5}{7x^2+4x} \overset{\frac{\infty}{\infty}}{=} \frac{3}{7}$$

$$\lim_{x\to 0} \frac{x^2-x+1}{x^2+x-3} = \frac{1}{-3}$$

$\frac{\infty}{\infty}, \frac{0}{0}, \infty\cdot 0, \infty-\infty$

$1^\infty, 0^0, \infty^0$

$$\lim_{x\to 0} \frac{x^2+2x}{x^5+7x} \overset{\frac{0}{0}}{=} \lim_{x\to 0} \frac{\cancel{x}(x+2)}{\cancel{x}(x^4+7)} = \frac{2}{7}$$

$$\lim_{x\to 0} \frac{(x^2+2x)'}{(x^5+7x)'} = \lim_{x\to 0} \frac{2x+2}{5x+7} = \frac{2}{7}$$

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

$$(e^{\square})' = e^{\square} \cdot (\square)'$$

$$(e^{2x})' = e^{2x} \cdot (2x)' = e^{2x} \cdot 2$$

$$(e^{\operatorname{arctg} x})' = e^{\operatorname{arctg} x} \cdot (\operatorname{arctg} x)' =$$

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

$$(\sqrt{\square})' = \frac{1}{2\sqrt{\square}}(\square)'$$

$$(\sqrt{x^2+5})' = \frac{1}{2\sqrt{x^2+5}} \cdot (x^2+5)' = \frac{\cancel{2}x}{\cancel{2}\sqrt{x^2+5}} = \frac{x}{\sqrt{x^2+5}}$$

$$f(x) = y = \sqrt{x^2+5}$$

$$y' = \lim_{\Delta x \to 0} \frac{\Delta y}{\Delta x} = \lim_{\Delta x \to 0} \frac{f(x+\Delta x) - f(x)}{\Delta x}$$

$$= \lim_{\Delta x \to 0} \frac{\sqrt{(x+\Delta x)^2+5} - \sqrt{x^2+5}}{\Delta x} \cdot \frac{\sqrt{(x+\Delta x)^2+5} + \sqrt{x^2+5}}{\sqrt{(x+\Delta x)^2+5} + \sqrt{x^2+5}} =$$

$$= \lim_{\Delta x \to 0} \frac{(x+\Delta x)^2+5-(x^2+5)}{\Delta x\left(\sqrt{(x+\Delta x)^2}+5+\sqrt{x^2+5}\right)} = \lim_{\Delta x \to 0} \frac{\cancel{x^2}+2x\Delta x+\Delta x^2 \cancel{+5} \cancel{-x^2} \cancel{-5}}{\Delta x\left(\sqrt{(x+\Delta x)^2+5}+\sqrt{x^2+5}\right)} =$$

$$\ln^3 x = (\ln x)^3 = \lim_{\Delta x \to 0} \frac{\cancel{\Delta x}(2x+\cancel{\Delta x})}{\cancel{\Delta x}\left(\sqrt{(x+\cancel{\Delta x})^2+5}+\sqrt{x^2+5}\right)} = \frac{2x}{\sqrt{x^2+5}+\sqrt{x^2+5}}$$

$$= \frac{\cancel{2}x}{\cancel{2}\sqrt{x^2+5}}$$

$$y = \sqrt{\underbrace{\ln^3 \sin^2(x+x^4)}+\underbrace{\cos x^2}}$$

$$y' = \frac{1}{2\sqrt{\ln^3 \sin^2(x+x^4)+\cos x^2}} \cdot \left(3\ln^2 \sin^2(x+x^4)\ \frac{1}{\sin^2(x+x^4)} \cdot\right.$$

$$\left.\cdot\ 2\sin(x+x^4)\cos(x+x^4)\cdot(1+4x^3)+(-\sin x^2)\cdot 2x\right)$$

$$f(x)^{g(x)}$$

$$\ln A^B = B \ln A$$

$$y = (\arcsin x)^{\ln x}$$

$$\ln y = \ln x \cdot \ln(\arcsin x)$$

$$\ln y = \ln x \cdot \ln(\arcsin x) \quad /'$$

$$\frac{1}{y} y' = \frac{1}{x} \ln(\arcsin x) + \ln x \cdot \frac{1}{\arcsin x} \cdot \frac{1}{\sqrt{1-x^2}}$$

$$y' = (\arcsin x)^{\ln x} \left(\frac{1}{x} \ln(\arcsin x) + \frac{\ln x}{\arcsin x} \cdot \frac{1}{\sqrt{1-x^2}} \right)$$

$$y = x^{x} \quad \Big|\ln$$

$$\ln y = \ln x^{x}$$

$$\ln y = x \cdot \ln x \quad \Big|'$$

$$\frac{1}{y} y' = \ln x + \cancel{x} \cdot \frac{1}{\cancel{x}}$$

$$y' = x^{x}(\ln x + 1)$$

$$(x^{n})' = n \cdot x^{n-1}$$

n — БРОЈ

$$(\sin x)^{5}$$

$$\sin x$$

$$(5x + \cos x)$$

$$\begin{cases} x = t^2+3 & \Rightarrow x'_t = 2t \\ y = 2t+t^3 & \Rightarrow y'_t = 2+3t^2 \end{cases}$$

$$y'_x = \frac{y'_t}{x'_t} = \frac{2+3t^2}{2t}$$

$$\begin{cases} x = t^2+3 \\ y'_x = \dfrac{2+3t^2}{2t} \end{cases}$$

$$\begin{cases} x = \ln(\operatorname{arctg} t^2) \Rightarrow x'_t = \dfrac{1}{\operatorname{arctg} t^2} \cdot \dfrac{1}{1+t^4} \cdot 2t \\[2ex] y = e^{\sin t^5} \Rightarrow y'_t = e^{\sin t^5} \cdot \cos t^5 \cdot 5t^4 \end{cases}$$

$$\begin{cases} y'_x = \dfrac{y'_t}{x'_t} = \dfrac{e^{\sin t^5} \cdot \cos t^5 \cdot 5t^{\cancel{4}\,3}}{\dfrac{1}{\operatorname{arctg} t^2} \cdot \dfrac{1}{1+t^4} \cdot 2\cancel{t}} = \dfrac{5}{2}\, t^3 (1+t^4)\, e^{\sin t^5} \cdot \cos t^5 \cdot \operatorname{arctg} t^2 \\[2ex] x = \ln(\operatorname{arctg} t^2) \end{cases}$$

$$\begin{cases} x = \sqrt[3]{t^4} + \frac{1}{\sqrt[3]{t^4}} = t^{\frac{4}{3}} + t^{-\frac{4}{3}} \Rightarrow x'_t = \frac{4}{3} t^{\frac{1}{3}} - \frac{4}{3} t^{-\frac{7}{3}} \\ \qquad = \frac{4}{3}\left(\sqrt[3]{t} - \frac{1}{\sqrt[3]{t^7}}\right) \\ y = t^4 + \frac{1}{t^4} \Rightarrow 4t^3 - 4t^{-5} = 4\left(t^3 - \frac{1}{t^5}\right) \end{cases}$$

$$y'_x = \frac{y'_t}{x'_t} = \frac{4\left(t^3 - \frac{1}{t^5}\right)}{\frac{4}{3}\left(\sqrt[3]{t} - \frac{1}{\sqrt[3]{t^7}}\right)}$$

$$\sqrt[m]{x^n} = x^{\frac{n}{m}}$$

$$\frac{1}{\sqrt[m]{x^4}} = x^{-\frac{n}{m}}$$