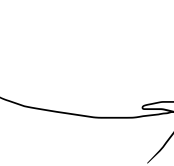


$\lim_{x \rightarrow \infty} \frac{x^2 + 3x + 5}{x + 4} = \infty$   
 $\lim_{x \rightarrow \infty} \frac{x + 5}{x^3 + 4x + 2} = 0$   
 $\lim_{x \rightarrow \infty} \frac{3x^2 + 5}{7x^2 + 4x} = \frac{3}{7}$

$\lim_{x \rightarrow 0} \frac{x^2 - x + 1}{x^2 + x - 3} = \frac{1}{-3}$   
 $\frac{\infty}{\infty}, \frac{0}{0}, \infty \cdot 0, \infty - \infty$   
 $\frac{1}{\infty}, \frac{0}{0}, \frac{\infty}{\infty}$



$\lim_{x \rightarrow 0} \frac{x^2 + 2x}{x^5 + 7x} = \frac{0}{0}$

$\lim_{x \rightarrow 0} \frac{x/(x+2)}{7/(x^4+7)} = \frac{2}{7}$   
 $\lim_{x \rightarrow 0} \frac{(x^2+2x)'}{(x^5+7x)'} = \lim_{x \rightarrow 0} \frac{2x+2}{5x+7} = \frac{2}{7}$

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

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

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

$$(e^{\arctan x})' = e^{\arctan x} \cdot (\arctan x)' =$$
$$= e^{\arctan x} \cdot \frac{1}{1+x^2}$$

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

$$\ln y = \ln x^x$$

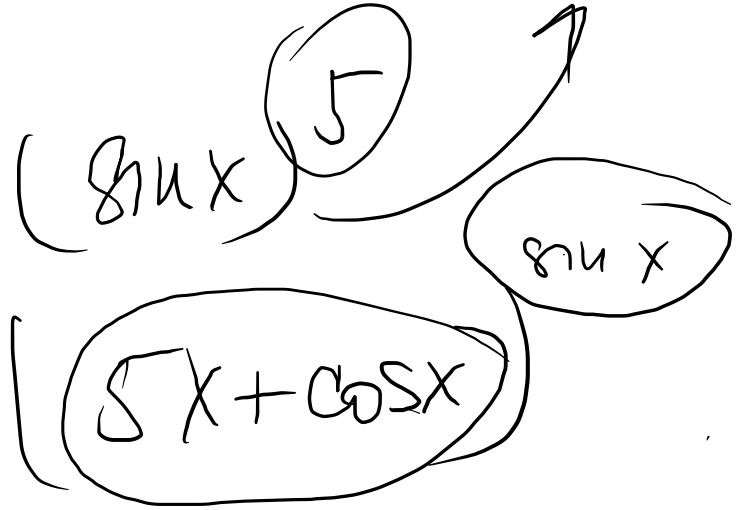
$$\ln y = x \cdot \ln x \quad | \prime$$

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

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

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

n-Brill



$$\left\{ \begin{array}{l} x = t^2 + 3 \\ y = 2t + t^3 \end{array} \right. \Rightarrow \begin{array}{l} x'_t = 2t \\ y'_t = 2 + 3t^2 \end{array}$$

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

$$\left\{ \begin{array}{l} x = t^2 + 3 \\ y'_x = \frac{2 + 3t^2}{2t} \end{array} \right.$$

$$x = \ln(\operatorname{arctg} t^2) \Rightarrow x'_t = \frac{1}{\operatorname{arctg} t^2} \cdot \frac{1}{1+t^4} \cdot 2t$$

$$y = e^{\sin t^5} \Rightarrow y'_t = e^{\sin t^5} \cdot \cos t^5 \cdot 5t^4$$

$$y'_x = \frac{y'_t}{x'_t} = \frac{e^{\sin t^5} \cdot \cos t^5 \cdot 5t^4}{\frac{1}{\operatorname{arctg} t^2} \cdot \frac{1}{1+t^4} \cdot 2t}$$

$$= \frac{5}{2} t^3 (1+t^4) e^{\sin t^5} \cdot \cos t^5 \cdot \operatorname{arctg} t^2$$

$$x = \ln(\operatorname{arctg} t^2)$$

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

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

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

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