05.12.07

s07-022

riešil(a): MIROSLAV DREVEŇÁK 5EIOM

1. $f'(x) = [x^{-2\sin 3x}]' = \cancel{-2\sin 3x \cdot x^{-2\sin 3x-1}} \cdot -2\cos 3x \cdot 3$

$= x^{-2\sin 3x}\cdot[-2\sin 3x \cdot \ln x]' = x^{-2\sin 3x}\cdot (-2\sin 3x)'\cdot \ln x + (-2\sin 3x)\cdot(\ln x)' =$

$= x^{-2\sin 3x}\cdot(-2\cos 3x \cdot 3)\cdot \ln x - 2\sin 3x\cdot \frac{1}{x}$

2. $f'(x) = [e^{-2\sin 3x}]' = e^{-2\sin 3x}\cdot\left(-2\cos(3x)\cdot 3\right)$

e^x

3. $f'(x) = [3^{-2\sin 3x}]' = 3^{-2\sin 3x}\cdot \ln 3\cdot\left(-2\cos(3x)\cdot 3\right)$

4. $f'(x) = [\sin^{-2} 3x]' = [(\sin 3x)^{-2}]' = -2(\sin 3x)^{-3}\cdot\cos(3x)\cdot 3$

5. $f'(x) = [x^{-2x+3}]' = \cancel{(-2x+3)\cdot x^{-2x+2}\cdot(-2)}$ $= x^{-2x+3}\left[(-2x+3)'\ln x + \frac{(-2x+3)\,x'}{x}\right] =$

x^a

$= x^{-2x+3}\left(-2\ln x + \frac{-2x+3}{x}\right)$

6. $f'(x) = [e^{-2x+3}]' = e^{-2x+3}\cdot(-2)$

e^x

7. $f'(x) = [3^{-2x+3}]' = \cancel{3^{-2x+3}\cdot \ln(-2x+3)}$ $= 3^{-2x+3}\cdot\ln 3\cdot(-2)$

a^x

8. $f'(x) = [(-2x+3)^{30}]' = 30(-2x+3)^{29}\cdot(-2)$

x^a

9. $f'(x) = [(-2x+3)^{-30}]' = -30\cdot(-2x+3)^{-31}\cdot(-2)$

x^a

10. $f'(x) = [\operatorname{arccotg}\frac{1}{x^4+2}]' = \frac{-1}{1+\frac{1}{(x^4+2)^2}}\cdot\frac{0\cdot(x^4+2x)-1\cdot(4x^3+2)}{(x^4+2x)^2}$

11. $f'(x) = [|3x+2|+|2x-1|]' =$

$++ \quad 3+2 = \underline{5}$

$+- \quad 3-2 = \underline{1}$

$-+ \quad -3+2 = \underline{-1}$

$-- \quad -3-2 = \underline{-5}$

$3x-2=0$

$(-\infty, -\frac{2}{3})$ ... $(-3x-2-2x+1)' = -3-2 = -5$

$(-\frac{2}{3}, \frac{1}{2})$ ... $(3x+2-2x+1)' = 3-2 = 1$

$(\frac{1}{2}, \infty)$ ... $(3x+2+2x-1)' = 3+2 = 5$

12. $f'(x) = [\sinh(\sinh(\sinh(\sinh(-6x))))]' = \sinh a = \cosh a \cdot a' = \cosh a\cdot\cosh b\cdot b' = \cosh a\cosh b\cosh c$

$\cdot c' = \cosh a\cdot\cosh b\cdot\cosh c\cdot\cosh(-6x)\cdot -6 =$

$= \cosh(\sinh(\sinh(\sinh(-6x))))\cdot\cosh(\sinh(\sinh(-6x)))\cdot\cosh(\sinh(-6x))\cdot\cosh(-6x)\cdot -6$

$a = \sinh(\sinh(\sinh(-6x)))$

$b = \sinh(\sinh(-6x))$

$c = \sinh(-6x)$

$c' = \cosh(-6x)\cdot -6$

13. $f'(x) = [\arccos\sin(5x^7+1)]' = \frac{-1}{\sqrt{1-(\sin(5x^7+1))^2}}\cdot\cos(5x^7+1)\cdot 35x^6$

$a = \sin(5x^7+1)$

$b = 5x^7+1$

$b' = 35x^6$

—pokračovanie—

14. $f'(x) = \left[\sqrt[5]{4x+3\sqrt[5]{4x+5\sqrt[5]{4x+7\sqrt[5]{4x}}}}\right]' = \frac{1}{5}\left(4x+3\sqrt[5]{4x+5\sqrt[5]{4x+7\sqrt[5]{4x}}}\right)^{-\frac{4}{5}} \cdot \left(4+3\frac{1}{5}\left(4x+5\sqrt[5]{4x+7\sqrt[5]{4x}}\right)^{-\frac{4}{5}}\right)$

$\cdot \left(4+5\cdot\frac{1}{5}\cdot\left(4x+7\sqrt[5]{4x}\right)^{-\frac{4}{5}}\right) \cdot \left(4+7\frac{1}{5}(4x)^{-\frac{4}{5}}\right) \cdot 4$

výpočet zo zadh !!!

15. $f'(x) = \left[\sqrt[5]{4x\sqrt[5]{4x\sqrt[5]{4x\sqrt[5]{4x}}}}\right]' = \frac{1}{5}\left(4x\cdot\sqrt[5]{4x\sqrt[5]{4x\sqrt[5]{4x}}}\right)^{-\frac{4}{5}} \cdot \left(\frac{1}{5}4\sqrt[5]{4x\sqrt[5]{4x\sqrt[5]{4x}}}+4x\cdot\frac{1}{5}\cdot\left(4x\sqrt[5]{4x\sqrt[5]{4x}}\right)^{-\frac{4}{5}}\right)\cdot$

$\cdot\frac{1}{5}\left(4\sqrt[5]{4x\sqrt[5]{4x}}+4x\cdot\frac{1}{5}\left(4x\sqrt[5]{4x}\right)^{-\frac{4}{5}}\cdot\frac{1}{5}4\sqrt[5]{4x}+4x\frac{1}{5}(4x)^{-\frac{4}{5}}\right)\cdot 4$

16. $f'(x) = \left[\ln|\mathrm{tgh}\,3x|^5\right]' = \frac{1}{(\mathrm{tgh}\,3x)^5}\cdot 5(\mathrm{tgh}\,3x)^4\cdot\frac{1}{\cosh^2 3x}\cdot 3 =$? $\Rightarrow$ druhú strany

17. $f'(x) = \left[\frac{2\cos 4x-3}{5\sin 4x+1}\right]' = \frac{[-2\sin(4x-3)\cdot 4]\cdot(5\sin 4x+1)-(2\cos 4x-3)\cdot(5\cos(4x+1)\cdot 4)}{(5\sin 4x+1)^2}$

18. $f'(x) = \left[(x^3-3x+2)(x^4-2x^3-3x^2+2x+3)\right]' = (3x^2-3)\cdot(x^4-2x^3-3x^2+2x+3)+(x^3-3x+2)\cdot$

$(4x^3-6x^2-6x+2)$

19. $f'(x) = \left[e^{2x}(x^4-2x^3-3x^2+2x+3)\right]' = 2e^{2x}\cdot(x^4-2x^3-3x^2+2x+3)+e^{2x}\left(4x^3-6x^2-6x+2\right)$

20. $f'(x) = \left[\ln(x^4-2x^3-3x^2+2x+3)^5\right]' = 5\cdot\frac{1}{x^4-2x^3-3x^2+2x+3}\cdot(4x^3-6x^2-6x+2)$

21. $f'(x) = \left[(\sin 5x+\cos 5x)(x^4-2x^3-3x^2+2x+3)\right]' = (5\cos 5x-5\sin 5x)\cdot(x^4-2x^3-3x^2+2x+3)+$

$(\sin 5x+\cos 5x)\cdot(4x^3-6x^2-6x+2)$

(14) $a^{\frac{1}{5}} \Rightarrow a = 4x + 3\sqrt[5]{4x+5\sqrt[5]{4x+7\sqrt[5]{4x}}} = 4x+3(b)^{\frac{1}{5}}$

$b = 4x + 5\sqrt[5]{4x+7\sqrt[5]{4x}} = 4x+5(c)^{\frac{1}{5}}$

$c = 4x+7\sqrt[5]{4x} = 4x+7(d)^{\frac{1}{5}}$

$d = 4x$

$d' = 4$

(15) $a^{\frac{1}{5}}$ $\quad a = 4x\cdot\sqrt[5]{4x\sqrt[5]{4x\sqrt[5]{4x}}} = 4x\cdot(b)^{\frac{1}{5}}$

$b = 4x\sqrt[5]{4x\sqrt[5]{4x}} = 4x\cdot(c)^{\frac{1}{5}}$

$c = 4x\sqrt[5]{4x} = 4x\cdot(d)^{\frac{1}{5}}$

$d = 4x$

$d' = 4$

(16) $(\ln|\operatorname{tgh} 3x|^5)' \Rightarrow (0,\infty)$

$$[\ln(\operatorname{tgh} 3x)^5]' = \frac{1}{(\operatorname{tgh} 3x)^5}\cdot 5(\operatorname{tgh} 3x)^4\cdot\frac{1}{\cosh^2(3x)}\cdot 3 = \frac{15(\operatorname{tgh} 3x)^4}{(\operatorname{tgh} 3x)^5\cosh^2(3x)} = \frac{15}{\operatorname{tgh} 3x\cosh^2(3x)}$$

$\Rightarrow (-\infty, 0)$

$$[\ln(-\operatorname{tgh} 3x)^5]' = \frac{1}{(-\operatorname{tgh} 3x)^5}\cdot 5\cdot(-\operatorname{tgh} 3x)^4\cdot\frac{1}{-\cosh^2(3x)}\cdot 3 = \frac{15\cancel{(-\operatorname{tgh} 3x)^4}}{(-\operatorname{tgh} 3x)^5(-\cosh^2(3x))} = \frac{15}{(-\operatorname{tgh} 3x)(-\cosh^2(3x))}$$