~~46~~ ~~X (14)~~ PETER MÁŠIAR 51025

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30. 11. 09

4b do **08.12.09**, 3b do **15.12.09**, 2b do **22.12.09**, 1b do **29.01.10** **ZS z07-021**

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

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

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

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

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

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

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

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

8. $f'(x) = [(3x-2)^{20}]' = 20(3x-2)^{19}\cdot 3$

9. $f'(x) = [(3x-2)^{-20}]' = -20(3x-2)^{-21}\cdot 3$

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

11. $f'(x) = \left[|4x-2|+|3x+1|\right]' =$

$(-\infty, -\frac{1}{2})$ ... $(-4x+2-3x-1)' = -4-3 = -7$

$(-\frac{1}{2}, -\frac{1}{3})$ .... $(4x-2-3x-1)' = 4-3 = 1$

$(-\frac{1}{3}, \infty)$ .... $(4x-2+3x+1)' = 4+3 = 7$

12. $f'(x) = [\cos(\cos(\cos(\cos 3x)))]' = -\sin(\cos(\cos(\cos 3x)))\cdot(-\sin(\cos(\cos 3x)))\cdot(-\sin(\cos 3x))\cdot(-\sin 3x)\cdot 3$

13. $f'(x) = [\arccos\sin(8x^7-1)]' = \dfrac{-1\cdot(\sin(8x^7-1))'}{\sqrt{1-(\sin(8x^7-1))^2}} = \dfrac{-1\cdot\cos(8x^7-1)\cdot 56x^6}{\sqrt{1-(\sin(8x^7-1))^2}}$

—pokračovanie—

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

$\cdot\left(3+6\frac{1}{5}\left(3x+6\sqrt[6]{3x}\right)^{-\frac{5}{6}}\right)\cdot\left(3\cdot 6\frac{1}{6}(3x)^{-\frac{5}{6}}\right)\cdot 3$

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

$\cdot\frac{1}{6}\left(3\sqrt[6]{3x\sqrt[6]{3x}} + 3x\cdot\frac{1}{6}\left(3x\sqrt[6]{3x}\right)^{-\frac{5}{6}}\cdot\frac{1}{6}\,3\sqrt[6]{3x} + 3x\,\frac{1}{5}(3x)^{-\frac{5}{6}}\right)\cdot 3$

16. $f'(x) = [\ln|\sinh 3x|^9]' = \frac{((\sinh 3x)^9)'}{(\sinh 3x)^9} = \frac{9\cancel{(\sinh 3x)^8}\cdot\cosh 3x\cdot 3}{(\sinh 3x)^9} = \frac{27\cosh 3x}{\sinh 3x}$

$\frac{(+(-\sinh 3x)^9)'}{(-\sinh 3x)^9} = \frac{9\cancel{(-\sinh 3x)^8}\cdot(-\cosh 3x)\cdot 3}{(-\sinh 3x)^9} = \frac{27(-\cosh 3x)}{(-\sinh 3x)}$

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

$= \frac{(-5\sin(4x+3)\cdot 4)\cdot(4\sin 4x+1) - (5\cos 4x+3)\cdot(4\cos(4x+1)\cdot 4)}{(4\sin 4x+1)^2}$

18. $f'(x) = [(x^3-x+1)(x^4-2x^3-3x^2+1)]' = (3x^2-1)\cdot(x^4-2x^3-3x^2+1) + (x^3-x+1)\cdot(4x^3-6x^2-6x)$

19. $f'(x) = [e^{2x}(x^4-2x^3-3x^2+1)]' = 2e^{2x}(x^4-2x^3-3x^2+1) + e^{2x}(4x^3-6x^2-6x)$

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

21. $f'(x) = [(\sin 5x+\cos 5x)(x^4-2x^3-3x^2+1)]' = (5\cos 5x-5\sin 5x)(x^4-2x^3-3x^2+1) + (\sin 5x+\cos 5x)\cdot(4x^3-6x^2-6x)$

(1.) $x^{3\sin(-2x)} = \left(\frac{1}{x^{3\sin 2x}}\right)' = \left(e^{-3\ln(x)\sin(2x)}\right)' = -3e^{-3\ln x\sin 2x}\cdot(\ln x\sin 2x)' =$

$= -3e^{-3\ln x\sin 2x}\cdot \ln x(\sin 2x)' + \sin 2x\cdot(\ln x)' = -3e^{-3\ln x\sin 2x}\left(\frac{\sin 2x}{x} + 2\ln x\cos 2x\right)$

(14.) $= (2(5(6(3x)^{\frac16}+3x)^{\frac16})+3x)^{\frac16}+3x)^{\frac16}{}' = (((2(5(3x+6\cdot 3^{\frac16}x^{\frac16})^{\frac16}+3x)^{\frac16}+3x)^{\frac16})' =$

$= \frac{2((5(3x+6\cdot3^{\frac16}x^{\frac16})^{\frac16}+3x)^{\frac16})'+3}{6(2(5(3x+6\cdot3^{\frac16}x^{\frac16})+3x)^{\frac16}+3x)^{\frac56}} = \frac{\frac{5((3x+6\cdot3^{\frac16}x^{\frac16})^{\frac16})'+3}{3(5(3x+6\cdot3^{\frac16}x^{\frac16})^{\frac16}+3x)^{\frac56}}+3}{6(2(5(3x+6\cdot3^{\frac16}x^{\frac16})^{\frac16}+3x)^{\frac16}+3x)^{\frac56}} =$

$= \frac{\frac{\frac{5(6(3^{\frac16}x^{\frac16})'+3)}{6(3x+6\cdot3^{\frac16}x^{\frac16})^{\frac56}}+3}{3(5(3x+6\cdot3^{\frac16}x^{\frac16})+3x)^{\frac56}}+3}{6(2(5(3x+6\cdot3^{\frac16}x^{\frac16})^{\frac16}+3x)^{\frac16}+3x)^{\frac56}} = \frac{\frac{\frac{5(6\cdot3^{\frac16}(x^{\frac16})'+3)}{6(3x+6\cdot3^{\frac16}x^{\frac16})^{\frac56}}+3}{3(5(3x+6\cdot3^{\frac16}x^{\frac16})^{\frac16}+3x)^{\frac56}}+3}{6(2(5(3x+6\cdot3^{\frac16}x^{\frac16})^{\frac16}+3x)^{\frac16}+3x)^{\frac56}} =$

$= \frac{\frac{\frac{5\left(\frac{3^{\frac16}}{x^{\frac56}}+3\right)}{6(3x+6\cdot3^{\frac16}x^{\frac16})^{\frac56}}+3}{3(5(3x+6\cdot3^{\frac16}x^{\frac16})^{\frac16}+3x)^{\frac56}}+3}{6(2(5(3x+6\cdot3^{\frac16}x^{\frac16})^{\frac16}+3x)^{\frac16}+3x)^{\frac56}}$

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

$= \frac{-4(5\cos 4x+3)(\sin 4x)'+(4\sin 4x+1)\cdot(5(\cos 4x))'+3(1)'}{(4\sin 4x+1)^2} = \frac{(-20\sin 4x)\cdot(4\sin 4x+1)-(16\cos 4x)(5\cos 4x+3)}{(4\sin 4x+1)^2}$

(15.) $\left(3x\left(3x\left(3x(3x)^{\frac16}\right)^{\frac16}\right)^{\frac16}\right)^{\frac16} = \left(3^{\frac{259}{1296}}x^{\frac{259}{1296}}\right)' = 3^{\frac{259}{1296}}\left(x^{\frac{259}{1296}}\right)' = \frac{259\cdot 3^{\frac{259}{1296}}}{1296\,x^{\frac{1037}{1296}}}$

(14.) $\left[\sqrt[6]{3x+2\sqrt[6]{3x+5\sqrt[6]{3x+6\sqrt[6]{3x}}}}\right]' = \frac16\left(3x+2\sqrt[6]{3x+5\sqrt[6]{3x+6\sqrt[6]{3x}}}\right)^{-\frac56}\cdot\left(3+2\frac16\left(3x+5\sqrt[6]{3x+6\sqrt[6]{3x}}\right)^{-\frac56}\right)\cdot$

$\cdot\left(3+5\frac16\left(3x+6\sqrt[6]{3x}\right)^{-\frac56}\right)\cdot\left(3+6\frac16(3x)^{-\frac56}\right)\cdot 3$

$a^{\frac16} \Rightarrow a = 3x+2\sqrt[6]{3x+5\sqrt[6]{3x+6\sqrt[6]{3x}}} = 3x+2(b)^{\frac16}$

$b = 3x+5\sqrt[6]{3x+6\sqrt[6]{3x}} = 3x+5(c)^{\frac16}$

$c = 3x+6\sqrt[6]{3x} = 3x+7(d)^{\frac16}$

$d = 3x$

$d' = 3$