Level 1 - Grundlagen - Blatt 2

Lösung A1

$f_1(x) = \ln^2(x)$	$f_1'(x) = \frac{2ln(x)}{x}$
$f_2(x) = \ln^3(2x)$	$f_2'(x) = \frac{3\ln^2(x)}{x}$
$f_3(x) = \ln(x^2)$	$f_3'(x) = \frac{2x}{x^2} = \frac{2}{x}$
$f_4(x) = ln(x^3)$	$f_4'(x) = \frac{3x^2}{x^3} = \frac{3}{x}$
$f_5(x) = \ln(5x^2 - 3)$	$f_5'(x) = \frac{10x}{5x^2 - 3}$
$f_6(x) = \lg(5x^2 - 3)$	$f_6'(x) = \frac{10x}{\ln(10) \cdot (5x^2 - 3)}$
$f_7(x) = \frac{x}{\ln(\sqrt{x})} = \frac{2x}{\ln(x)}$	$f_7'(x) = \frac{2(\ln(x)-1)}{\ln^2(x)}$
$f_8(t) = \ln(x) - \ln\left(\frac{t}{2}\right)$	$f_8'(t) = -\frac{1}{t}$
$f_9(t) = 3 \ln^2(t) - 2 \ln(t)$	$f_9'(t) = \frac{6\ln(t) - 2}{t}$

Lösung A2

$f_1'(x) = \frac{4x - 1}{4x^2 - 2x}$	$f_{18}(x) = 0.5 \cdot \ln(4x^2 - 2x)$
$f_2'(x) = -\frac{\cos(x)}{\sin(x-1)\cdot \ln^2(\sin(x)-1)}$	$f_{17}(x) = \frac{1}{\ln(\sin(x) - 1)}$
$f_3'(x) = -\frac{\pi sin(\ln(x))}{x}$	$f_{16}(x) = \pi cos(ln(x)) + 1$
$f_4'(x) = \frac{42x^6}{4 - x^7}$	$f_{15}(x) = ln((4 - x^7)^{-6})$
$f_5'(x) = -\frac{24}{\ln(10) \cdot x}$	$f_{14}(x) = -2(2 \lg(x^3) + 3 \lg(x^2))$
$f_6'(x) = \frac{4 \cdot ((4x+5) \cdot \ln(4x+5) - 1)}{(4x+5) \cdot e^{4x-5}}$	$f_{13}(x) = \frac{\ln(4x+5)}{e^{4x-5}}$
$f_7'(x) = 0$	$f_{12}(x) = \frac{\ln(x)}{\log_5(x)}$
$f_8'(x) = \frac{(k-1) \cdot k \cdot ln^{k-2}(2x)}{x}$	$f_{11}(x) = k \cdot ln^{k-1}(2x)$
$f_9'(x) = \frac{2 \cdot \ln(x)}{\ln(7) \cdot x}$	$f_{10}(x) = ln(x) \cdot log_7(x)$

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Lösung A3

$f_1(x) = \ln((4x^2 - 2x)^3)$	$f_1'(x) = \frac{3(4x^2 - 2x)^2 \cdot (8x - 2)}{(4x^2 - 2x)^3} = \frac{3 \cdot (8x - 2)}{4x^2 - 2x} = \frac{12x - 3}{2x^2 - x}$
$f_2(x) = \ln((x^3 - 2x)^m)$	$f_{2}'(x) = \frac{m(x^{3}-2x)^{m-1} \cdot (3x^{2}-2)}{(x^{3}-2x)^{m}} = \frac{m \cdot (3x^{2}-2)}{x \cdot (x^{2}-2)}$ $f_{3}'(x) = \frac{5 \cdot (5x^{4}-4x^{3})}{x^{5}-x^{4}} = \frac{5x^{3}(5x-4)}{x^{3}(x^{2}-x)} = \frac{5(5x-4)}{x(x-1)}$
$f_3(x) = ln((x^5 - x^4)^5)$	$f_3'(x) = \frac{5 \cdot (5x^4 - 4x^3)}{x^5 - x^4} = \frac{5x^3 (5x - 4)}{x^3 (x^2 - x)} = \frac{5(5x - 4)}{x(x - 1)}$
$f_4(x) = \ln((3x^3 + 5x)^6)$	$f_4'(x) = \frac{6(9x^2+5)}{3x^3+5x} = \frac{6(9x^2+5)}{x(3x^2+5)}$
$f_5(x) = ln(cos^7(x))$	$f_5'(x) = -\frac{7\cos^6(x)\cdot\sin(x)}{\cos^7(x)} = -\frac{7\sin(x)}{\cos(x)} = -7\tan(x)$
$f_6(x) = \ln(2x^{-2} + 3x^2)$	$f_6'(x) = \frac{-4x^{-3} + 6x}{2x^{-2} + 3x^2} = \frac{6x^4 - 4}{3x^5 + 2x}$
$f_7(x) = 27 \ln\left(x^3 - \frac{1}{x}\right)$	$f_7'(x) = \frac{27(3x^2 + \frac{1}{x^2})}{x^3 - \frac{1}{x}} = \frac{27(3x^4 + 1)}{x^5 - x}$
$f_8(x) = \frac{1}{\ln(2x^2 - 4x)}$	$f_8'(x) = -\frac{4(x-1)}{(2x^2 - 4x) \cdot \ln^2(2x^2 - 4x)} = -\frac{2(x-1)}{x \cdot (x-2) \cdot \ln^2(2x^2 - 4x)}$
$f_9(x) = \sin(\ln(x+5))$	$f_9'(x) = \frac{\cos(\ln(x+5))}{x+5}$
$f_{10}(x) = \ln(\sin(x+5))$	$f_{10}'(x) = \frac{\cos(x+5)}{\sin(x+5)}$
$f_{11}(x) = \lg(7x+5)$	$f_{11}'(x) = \frac{7}{\ln(10)\cdot(7x+5)}$
$f_{12}(x) = lg\left(\left(\frac{1}{2}x^2 + 2x\right)^4\right)$	$f_{12}'(x) = \frac{4\left(\frac{1}{2}x^2 + 2x\right)^3 \cdot (x+2)}{ln(10) \cdot \left(\frac{1}{2}x^2 + 2x\right)^4} = \frac{4 \cdot (x+2)}{ln(10) \cdot \left(\frac{1}{2}x^2 + 2x\right)} = \frac{8(x+2)}{ln(10) \cdot x \cdot (x+4)}$
$f_{13}(x) = \frac{1}{\ln(x-3)}$	$f_{13}'(x) = -\frac{1}{(x-3) \cdot \ln^2(x-3)}$
$f_{14}(x) = \frac{3ln(2x)}{(x^2 - 1)^2}$	$f_{14}'(x) = \frac{\frac{6 \cdot (x^2 - 1)^2}{2x} - 3 \ln(2x) \cdot 2(x^2 - 1) \cdot 2x}{(x^2 - 1)^4} = \frac{3(x^2 - 1) - 12x^2 \cdot \ln(2x)}{x \cdot (x^2 - 1)^3}$
$f_{15}(x) = ln(\sqrt{x^3})$	$f_{15}'(x) = \frac{1}{3x}$
$f_{16}(x) = \log_a(\sqrt[3]{3 - 2x})$	$f_{16}'(x) = -\frac{2}{3 \cdot ln(a)(3-2x)} = \frac{2}{3 \cdot ln(a)(2x-3)}$