# Aufgabenblatt Ableitungen
## zur Umkehrregel (Ableitung der Logarithmusfunktion)

Level 1 – Grundlagen – Blatt 2

Dokument mit 34 Aufgaben

## Aufgabe A1

Bilde die 1. Ableitung der gegebenen Funktionsgleichungen $f_n(x)$.

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

## Aufgabe A2

Ordne den gegebenen Ableitungsfunktionen $f_n'(x)$ ihre ursprüngliche Ausgangsfunktion $f_n(x)$ zu.

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

## Aufgabe A3

Bilde die 1. Ableitung der gegebenen Funktionsgleichungen $f_n(x)$.

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

## Lösung A1

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

## Lösung A2

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

## Lösung A3

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