

**Praktikum  
Analysis 1  
WS 2011/2012  
Blatt 11 (Lösungen)  
12. Jänner 2012**

(1) Lösung von Aufgabe (2):

1.  $f'_1(k) = 4xk^{x-1}$
2.  $f'_2(z) = 2 \sin z \cos z = \sin 2z$
3. Wir berechnen

$$f'_3(x) = 3x^2 e^x \tan x + x^3 e^x \tan x + x^3 e^x (1 + \tan^2 x) = x^2 e^x ((3+x) \tan x + x(1 + \tan^2 x))$$

4.  $f'_4(x) = \frac{1}{2} (e^x + e^{-x}) =: \cosh x$
5. Wir berechnen

$$f'_5(b) = \frac{\frac{1}{2\sqrt{b}} \sin^4 b - 4\sqrt{b} \sin^3 b \cos b}{\sin^8 b} = \frac{1}{2\sqrt{b} \sin^4 b} - \frac{4\sqrt{b} \cos b}{\sin^5 b}$$

6. Wir berechnen

$$\begin{aligned} f'_6(a) &= \frac{d}{da} \left( \sinh e^{a^{13/2}} \right)^{1/2} \\ &= \frac{1}{2 (\sinh e^{a^{13/2}})^{1/2}} \frac{d}{dx} \left( \sinh e^{a^{13/2}} \right) \\ &= \frac{\cosh e^{a^{13/2}}}{2 (\sinh e^{a^{13/2}})^{1/2}} e^{a^{13/2}} \frac{13}{2} a^{12} \\ &= \frac{13a^{12} \left( \cosh e^{a^{13/2}} \right) e^{a^{13/2}}}{4 (\sinh e^{a^{13/2}})^{1/2}} \end{aligned}$$

7.  $f'_7(x) = \frac{d}{dx} (e^{x \log a}) = a^x \log a$

8. Die Anwendung über die Ableitung der Umkehrfunktion gibt

$$\frac{d}{dx} \log(x) = \frac{1}{e^{\log x}} = \frac{1}{x}$$

und daher gilt

$$\frac{d}{dx} \log_a(x) = \frac{d \log x}{dx \log a} = \frac{1}{x \log a}.$$

9. Wir berechnen

$$f_9(z) = \frac{d}{dz} e^{\cos z \log(\sin z)} = e^{\cos z \log(\sin z)} \left( \frac{\cos^2 z}{\sin z} - \sin z \log(\sin z) \right)$$