Technische Hochschule Rosenheim
Applied Artificial Intelligence - Bachelor
Analysis 1
Priv.-Doz. Dr. S.-J. Kimmerle

WiSe 2021/22

Thursday, 02.12.2021

Exercise 9: differential calculus I

Exercise 27

Compute for $x \in \mathbb{R}$ the derivatives of

a) $f(x) = a^x$ where $a \in \mathbb{R}^+$,

b) $g(x) = \cot(x)$ restricted to $(0, \pi)$,

c) $h(x) = \sinh(x)$.

d) $j(x) = \cosh(x)$.

e) $k(x) = \ln\left(1 + (1+x^2)^4\right)$

Exercise 28

Show for $x \in \mathbb{R}$ and $n \in \mathbb{N}$

$$\left(\frac{d}{dx}\right)^n \left(x^2 e^x\right) = \left(x^2 + 2nx + n(n-1)\right) e^x.$$

Exercise 29

a) Determine the equation of the tangent line to the graph of the function

$$f(x) = \sqrt{16 - x^2}, \quad x \in (-4, 4)$$

at the point $x_0 = 1$.

b) Let a curve

$$y = \frac{1}{3}x^3 - x$$

in the real plane be given.

At which point(s) is the tangent line of this curve parallel to the straight line with the equation

$$y = \frac{1}{4}x - 2 \quad ?$$