Technische Hochschule Rosenheim WiSe 2021/22
Applied Artificial Intelligence - Bachelor
Analysis 1

Priv.-Doz. Dr. S.-J. Kimmerle Thursday, 23.12.2021

Exercise 12: integration

Exercise 37

a) Assume $[a,b] \subset (-\frac{\pi}{2}, \frac{\pi}{2})$. Simplify

$$\int_a^b \tan(t)\,dt$$

using the substitution rule.

b) Assume $0 < a < b$ and $c > 0$, $c \neq 0$. Simplify

$$\int_a^b \log_c(x)\,dx$$

using integration by parts.

c) Simplify for $-1 < x < 1$

$$\int \arcsin(x)\,dx.$$

Exercise 38

a) Show that the inverse function of $\cosh|_{\mathbb{R}^+} : \mathbb{R}_0^+ \to \mathbb{R}$, called **area cosinus hyperbolicus**,

$$\mathrm{Arcosh} : [1,\infty] \to \mathbb{R}_0^+$$

exists. Check that

$$\mathrm{Arcosh}(s) = \ln\left(s + \sqrt{s^2-1}\right), \quad s \geq 1$$

holds.

b) Using the substitution $x = \cosh(t)$ and a) compute

$$\int_a^b \frac{1}{\sqrt{x^2-1}}\,dx$$

for $1 < a < b$.

Exercise 39

Find a primitive

$$\frac{1}{x^2-5}$$

using the partial fraction expansion.