Technische Hochschule Rosenheim
Applied Artificial Intelligence - Bachelor
Analysis 2
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SoSe 2022

Thursday, 25.03.2022

Homework 2: revision integral calculus

To submit: on **Friday, 01.04.2022**, 9:00 a.m., online by the learning campus

Exercise 1 (6 pt.)
Compute the following integrals:

a) $\int_{-1}^{1} |x|\,dx$

b) $\int_{-\pi}^{\pi} \sin(x)\,dx$

c) $\int_{0}^{\pi} 4\cos(t)\,dx, \quad t \in \mathbb{R}$

d) $\int_{0}^{\pi} (3\sin(x) + 5\cos(x))\,dx$

e) $\int_{1}^{2} e^x\,dx$

f) $\int_{0}^{1} (\exp(t) + 2t)\,dt$

Exercise 2 (4 pts.)
Consider the piecewise defined, continuous function $f(x) = \begin{cases} \sqrt{x} & \text{for } 0 \le x \le 4, \\ \frac{1}{2}x^2 - 6x + 18 & \text{for } 4 < x. \end{cases}$

Compute the area enclosed by the x-axis and the function f and the vertical lines $x = 0$ and $x = 6$. Please provide a plot.

Exercise 3 (3 pts.)
Compute the following indefinite or improper integrals:

a) $\int \left(\exp(y) - 3y^2\right)\,dy$

b) $\int \frac{x^2 \cdot \sqrt{x}}{\sqrt[3]{x^5}}\,dx$

c) $\int_{-1}^{\infty} |x|^{-2}\,dx$

Exercise 4 (3 pts.)
Is it possible that for the same function $f(x)$

$$\int f(x)\,dx = \frac{x}{x-1} + C_1$$

as well as

$$\int f(x)\,dx = \frac{1}{x-1} + C_2$$

are primitives? ($C_1, C_2 \in \mathbb{R}$)
Please explain your answer rigorously and determine the function(s) $f(x)$.