Surname: ..... Forename: ..... MatrNo.: .....

Exam: Mathematics 2

Hamburg University of Applied Science
Faculty of Engineering & Computer Science, Department of Information and Electrical Engineering
Prof. Dr. Robert Heß, January 30th 2023, duration: 90 Min.
Permitted aids: up to six A4-pages of personal notes (i.e. single sided sheets)

Result: ..... of 100 points Mark: ..... points.

Problem 1 (15 points)

Solve the following integral (mind the pole at pole at $x=0$): $\int_0^1 \frac{1}{\sqrt{x}}\,\mathrm{d}x$

Problem 2 (15 points)

Create a parametric plot for $f(x,y) = \begin{cases} \mathbb{R}^2 \to \mathbb{R} \\ (x,y) \mapsto x^y \end{cases}$ treating x as a parameter with $x = 0.5, 1, 1.5$ and $y \in [0,2]$.

Problem 3 (10 points)

For $u(t) = \hat{u}\sin(\omega t + \varphi_0)$ with $\hat{u}$ and φ_0 being parameters create the differential equation.

Problem 4 (25 points)

For the differential equation $y' = y''' + 3x^2$ find the general solution $y(x)$.

Problem 5 (10 points)

You choose by random three people out of ten of which the first wins 100 €, the second 60 € and the third 30 €. How many options are there? Explain your answer.

Problem 6 (25 points)

For the probability density function $f(x) = \begin{cases} \cos(x)/2 & \text{for } -\frac{\pi}{2} < x < \frac{\pi}{2} \\ 0 & \text{otherwise} \end{cases}$
evaluate expectation, variance and standard deviation.