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, 25.1.2016, 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 (20 points)

Solve the following integral: $\int_{-2}^{2} |x^2 - 1| \, \mathrm{d}x$

Problem 2 (15 points)

Draw a vector plot of the function $\boldsymbol{f}(x, y) = (y, -x)$ for $x, y \in \{-2, -1, 0, 1, 2\}$

Problem 3 (25 points)

For the differential equation $y'' + y = \cos(x)$ find the general solution $y(x)$.

Problem 4 (10 points)

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

Problem 5 (20 points)

A random variable X has the probability density function $f(x) = \begin{cases} -x & \text{for } -1 \leq x \leq 0 \\ x & \text{for } 0 < x \leq 1 \end{cases}$.
Evaluate expectation, variance and standard deviation.

Problem 6 (10 points)

For six six-sided unbiased dice what is the probability to throw the numbers one to six in one go?