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

Exam: Calculus II

Hamburg University of Applied Science
Faculty of Engineering & Computer Science, Department of Information and Electrical Engineering
Prof. Dr. Robert Heß, July 3rd 2013, duration: 90 min.

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

Problem 1 (20 points)

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

Problem 2 (15 points)

For the function $f : \begin{cases} \mathbb{R}^2 \to \mathbb{R}^2 \\ (x, y) \mapsto (y, -x) \end{cases}$ sketch the vector plot in the range of $x, y \in [-2, 2]$.

Problem 3 (15 points)

Evaluate the Hessian matrix H for the function: $f(x, y) = x \sin(2y)$

Problem 4 (15 points)

For the DE $y''' - 3y' - 2y = 0$ find the general solution for $y(x)$.

Problem 5 (20 points)

For the DE $y'' - 4y + 2x^2 = 0$ find the general solution for $y(x)$.

Problem 6 (15 points)

In an electrical device four resistors are in series connection. Each resistor has a resistance of $100\,\Omega$ with standard deviation of $\pm 1\,\Omega$. We assume normal distribution and independence between the resistors.

1. Evaluate expectation, variance and standard deviation for the series connection.
2. For a specification of $400\,\Omega \pm 5\,\Omega$ for the series connection evaluate the expected failure rate.