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 25th 2017, 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: $\int_{-2}^{3} |x^2 - 1| \, \mathrm{d}x$

Problem 2 (15 points)

Derive the Hessian matrix for $f(x, y, z) = xy^2 + y\sin(z) - ze^x$.

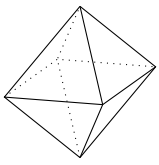
Problem 3 (25 points)

For the differential equation $y''' + 6y = 7y' + 4e^x$ find the general solution $y(x)$.

Problem 4 (10 points)

For $y(x) = e^{\mathrm{j}(ax+b)}$ with a and b being parameters create the differential equation.

Problem 5 (15 points)



A special unbiased die has eight sides with the numbers 1, 1, 1, 2, 2, 2, 3, 4. Evaluate expectation, variance and standard deviation of this die.

Problem 6 (20 points)

Out of 10 000 produced 100 nF capacitors specified with 10 % tolerance 139 turn out to be too large and another 139 to be too small in capacitance. Assuming normal distribution what is the standard deviation of capacitance?