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

Exam: Calculus II

Hamburg University of Applied Science
Faculty of Engineering & Computer Science, Department of Information and Electrical Engineering
Prof. Robert Heß, July 3rd 2012, duration: 90 Min.

Result: ..... of 68 points Mark: ..... points.

Question 1 (8 points)

Solve the following integral: $\int x^2 \sin(x)\,\mathrm{d}x$

Question 2 (8 points)

Create the Hessian matrix H for the function $f(x, y) = x^2 e^{-y}$

Question 3 (20 points)

Find for the differential equation $y + 2e^x = y''$ the function $y(x)$.

Question 4 (8 points)

For the function $y(x) = c\,\cos(\omega x)$ with ω being a known constant create a differential equation.

Question 5 (14 points)

A random variable X has the following probability mass function:

$$f(x) = \begin{cases} x/2 & \text{for } 0 \leq x \leq 2 \\ 0 & \text{otherwise} \end{cases}$$

Find the expectation and variance of X.

Question 6 (10 points)

You monitor a quantity in a production process and find its mean to be 12.1 mm with a standard deviation of 0.2 mm. The quantity is specified with 12 mm $\pm$0.5 mm and the probability mass function of the measured quantity can be approximated by a normal distribution. What failure rate do you expect?