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, February 1st 2013, duration: 90 Min.

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

Problem 1 (25 points)

Solve the following integral: $\int \frac{3x-5}{x^2-3x+2}\,\mathrm{d}x$

Problem 2 (10 points)

Derive the Jacobian matrix J for the function $f : \begin{cases} \mathbb{R}^2 \to \mathbb{R}^2 \\ (x,y) \mapsto (x\,e^{-y}, y\,\sin(2\pi x)) \end{cases}$

Problem 3 (20 points)

Find for the differential equation $\frac{y'+2y}{e^{-2x}} = 1$ the function $y(x)$.

Problem 4 (15 points)

For the function $y(x) = a\,x^2 - b\,x$ create a differential equation.

Problem 5 (20 points)

A random variable Y has the following probability mass function:

$$f(y) = \begin{cases} 2(1-y) & \text{for } 0 \le y \le 1 \\ 0 & \text{otherwise} \end{cases}$$

Find expectation and variance of Y.

Problem 6 (10 points)

You pile up ten bricks each having height μ_1 with standard variation σ_1. Approximate the height of the pile by a normal random variable X_n defined by its probability mass function $f(x)$.