

## Exam: Mathematics 2

Hamburg University of Applied Science  
Faculty of Engineering & Computer Science, Department of Information and Electrical Engineering  
Prof. Dr. Robert Heß, January 24<sup>th</sup> 2019, duration: 90 Min.  
Permitted aids: up to six A4-pages of personal notes (i.e. single sided sheets)

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

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### **Problem 1 (15 points)**

Solve the following integral:  $\int_{-2}^2 |x^2 - x| dx$

### **Problem 2 (20 points)**

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

### **Problem 3 (10 points)**

For  $y(t) = a e^{bt}$  with  $a$  and  $b$  being parameters create the differential equation for  $y(t)$ .

### **Problem 4 (30 points)**

For the differential equation  $y'' = y' + 2y + 3e^{2x}$  find the general solution  $y(x)$ .

### **Problem 5 (10 points)**

You plan to take 5 of your 10 favourite books to your summer holiday trip. How many options do you have? Explain your answer.

### **Problem 6 (15 points)**

An unbiased six-sided die has the numbers 1, 1, 1, 2, 3, 4. Evaluate expectation, variance and standard deviation of this die.