Jacobs University Bremen **Spring Semester 2020**
Prof. Dr. T. Preusser

Numerical Methods I
How to prepare for final exam on 20.05.2020

To prepare for the final exam you should

- study all definitions, theorems, and examples given in class,
- study all graded homework problems

that are related to the relevant topics from below.

The homework w/o credit will not be covered in the final exam. Also, I will not ask specifically for the content of definitions or theorems. However you need to have the methodology and formulas ready.

In the exam, only pen, blank paper, and calculator are allowed. That means that no notes, no cheat sheet, no books are allowed. Carefully look at all information about the online exam that has been provided by admin to you.

Topics relevant are:

- Taylor series and Taylor theorem, error terms and asymptotic error
- Gaussian elimination with and w/o pivoting, scaled partial pivoting
- LU decomposition
- Cholesky decomposition
- Methods for root finding and their errors: Bisection method, Newton's method, Secant method
- type and order of convergence
- polynomial interpolation, collocation matrix
- Lagrange interpolation,
- Newton interpolation
- piecewise interpolation
- spline interpolation, B-splines
- least squares approximation
- difference quotients
- Richardson extrapolation
- lower- and upper Riemann sum
- trapezoidal rule
- Romberg algorithm

Clearly, you must also be proficient in all prerequisites from Calculus and Linear Algebra that are associated to the above mentioned topics.