Test for "Computer Sciences for Engineers" !!! SAMPLE !!!

date, starting time - finishing time (deadline to upload files: ...)

Things to do before the test.

The followings should be written at the top of each page:

- Name
- Neptun code
- Page number

Tasks

- 1. Use the interval halving method to approximate the root of the function $f(x) = e^x 4x^2$ on the interval [0.2, 1.2] with error 0.01. (20 points)
- 2. Use the fixed-point iteration to approximate the solution of the equation $e^x = 4x^2$ on the interval [0, 2] with error 0.03. (20 points)
- 3. Use the Gauss-Seidel method to approximate the solution of the following system of linear equations Ax = b starts from x_0 in four steps.

$$A = \begin{bmatrix} 10 & -2 & 2 \\ -3 & 10 & 2 \\ 2 & -4 & 10 \end{bmatrix}, \qquad b = \begin{bmatrix} 1 \\ 5 \\ -1 \end{bmatrix}, \qquad x_0 = \begin{bmatrix} 1 \\ 1 \\ 1 \end{bmatrix}$$
(20 points)

4. Approximate the value of the following integral by trapezoidal rule, when the number of the subintervals is 8.

$$\int_{1}^{5} \ln(x^3) dx$$

How many parts must the interval be divided so that the approximation error is less than 0.001? (20 points)

5. Approximate the least eigenvalue (in absolute value) and its eigenvector of the following matrices in four steps. Let the starting vector be $x^{(0)}$.

$$A = \begin{bmatrix} 1 & 2 & 0 \\ 2 & 1 & 0 \\ 0 & 5 & 1 \end{bmatrix}, \qquad x^{(0)} = \begin{bmatrix} 2 \\ 0 \\ 3 \end{bmatrix}$$
(20 points)

Things to do after the test:

- 1. Check that every page contains the datas (name, Neptun-code, page number).
- 2. Digitalize your solutions (photos and scanned files are also accepted). Please, let the file names be clear.

3. Upload the files. Do not compress the files! Classroom gives possability to upload more files together.

4. Submit your solutions.