Homework 1 (B0B17MTB, BE0B17MTB)

Problem Set 1

October 11, 2021

1 Assignment

For all the following problems, consider N as a positive integer. Please, do not use the `for`/`while` cycle and/or `if`/`switch` branching.

Problem 1-A Create a matrix $\mathbf{A} \in \mathbb{R}^{N \times 5}$:

$$\mathbf{A} = \begin{bmatrix} 0 & 1 & 1 & 1 & 0/(N-1) \\ 0 & 1 & 1 & 2 & 1/(N-1) \\ 0 & 1 & 1 & 3 & 2/(N-1) \\ \vdots & \vdots & \vdots & \vdots & \vdots \\ 0 & 1 & 1 & N & (N-1)/(N-1) \end{bmatrix}. \tag{1}$$

Do not enter the numbers element-wise, use the MATLAB functions instead.
(**1 point**)

Problem 1-B Calculate the norm of the vectors arranged one below the other in matrix $\mathbf{B} \in \mathbb{R}^{N \times 3}$ and normalize them to unitary size. To solve the problem and to verify the solution, use the following matrix:

```
B = reshape((1:3*N), 3, []).'
```

(**1 point**)

Problem 1-C Find all the elements in the general matrix $\mathbf{C} \in \mathbb{R}$ greater than or equal to $x = N/2$, return them to vector $\mathbf{u}$ and replace these values in the original matrix $\mathbf{C}$ by 0. The following matrix $\mathbf{C}$ is used to validate the solution:

```
C = magic(N)
```

(**2 points**)

Problem 1-D Create a matrix $\mathbf{D} \in \mathbb{R}^{N \times N}$ defined as

$$D_{mn} = 2N + 1 - (m + n), \tag{2}$$

where N denotes the size of matrix $\mathbf{D}$, m denotes the row index, and n denotes the column index. Try to find as simple a solution as possible.
(**1 point**)

2 Instructions

The deadline for all assignments is

- October 25, 23:59 (Monday's group, B0B17MTB),

Download the Homework grader and enter your solutions, in the corresponding places, into m-files `problem1{A-D}`. Validate the solution via `homework1.p` (right-click on `homework1.p` in Current Folder and choose `Run`, or press F9). You can run the grader as many times as you want. Once you are satisfied with your result, choose option "7: GENERATE SUBMISSION", and attach the generated zip archive to the BRUTE system.

All the problems are to be solved by students individually (notice the BRUTE system has a duplicity checker). Do not use functions from the MATLAB Toolboxes.

Contact us at matlab@fel.cvut.cz with any questions or comments. The team of teachers wishes you good luck in solving the problems.