

# Homework (B0B17MTB, BE0B17MTB)

## Problem Set 1

March 1, 2021

## 1 Assignment

For all the following problems, consider  $N$  being positive integer, e.g.,  $N = 10$ .

Problem 1-A Create a matrix

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

without any `for/while` cycle. Do not enter the numbers element-wise, use rather MATLAB functions. **(1 point)**

Problem 1-B Calculate norm of vectors arranged one below each other in a matrix  $\mathbf{B} \in \mathbb{R}^{N \times 3}$  and normalize them to unitary size. Do not use `for/while` cycle. 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 elements in matrix  $\mathbf{C}$  greater than or equal to  $x_{\min} = N/2$ , return them in a vector  $\mathbf{u}$  and replace these values in the original matrix  $\mathbf{C}$  by new values  $\hat{x} = 2x$ . Do not use `for/while` cycle or `if/else` statement. Following matrices  $\mathbf{C}$  can be used to validate the solution

```
C = gallery('circul', N)
C = magic(N)
```

**(2 points)**

Problem 1-D Create a matrix  $\mathbf{D}$ , defined as

$$D_{ij} = 2N + 1 - (i + j), \quad (2)$$

where  $N$  denotes the size of the matrix  $\mathbf{D}$ ,  $i$  denotes the row index, and  $j$  denotes the column index. Do not use `for/while` cycle. Try to find as simple solution as possible. **(1 point)**

## 2 Instructions

Complete all the assignments till

- March 7, 23:59 (Monday's group, B0B17MTB),
- March 9, 23:59 (Wednesday's group, BE0B17MTB).

Write your solutions into m-files called `Problem1_{A-D}` and upload them via the [BRUTE system](#). In the case of uploading more files, add them into ZIP archive. Together with that, you can use the Homework grader and validate the solution via `homework1.p` (right-click on `homework1.p` in Current Folder and choose Run, or press F9). You can start the grader as many times as you want. Once you are satisfied with your result, choose the option ("6: GENERATE SUBMISSION"), and attach the generated file `HW1token.txt` to the BRUTE system as well.

All the problems shall be solved by the students individually (notice the BRUTE system has a duplicity checker). Do not use functions from MATLAB Toolboxes. Contact [matlab@fel.cvut.cz](mailto:matlab@fel.cvut.cz) with any questions.