Homework (B0B17MTB)

Problem Set 1

October 8, 2019

1   Assignment

For all the following problems, consider $N = 10$. However, in general, it can be any positive integer.

Problem 1-A Create a matrix

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

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 $\mathbf{C}$, defined as

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

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 $\widehat{x} = 2x$. Do not use `for`/`while` cycle or `if`/`else` statement. (**2 points**)

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

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

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

- October 14th, 23:59 (Monday's group),
- October 16th, 23:59 (Wednesday's group).

Upload the solution as an m-file via the BRUTE system. Together with that, fill your solutions into m-files called `Problem1_{A-D}` in the Homework checker and start validation via `homework1.p`. You can start validator as many times as you want. Once all the solutions are valid or you are satisfied with your result, choose option ("6: GENERATE SUBMISSION CODE"), 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). Contact `matlab@elmag.org` with any questions.