# EE2021 Computer Tools for Electrical Engineering
Project 1

Due: November 21, 2018 15:30

Please compress all of the m files, adjMatrix.mat and report.docx files to
"ee2021_project1_name_surname_studentno.zip", and send it to
ee2021projects[at]gmail.com until due date and time.
Also, hand in the hard copy version of your project report to Asst. Prof. Onur Cihan until
due date and time.

In graph theory, adjacency matrix is a square matrix which represents the connections of
the vertices in the graph. If there is direct information flow from vertex j to vertex i, then
(i, j)-th component of the adjacency matrix is equal to 1, and 0 otherwise.
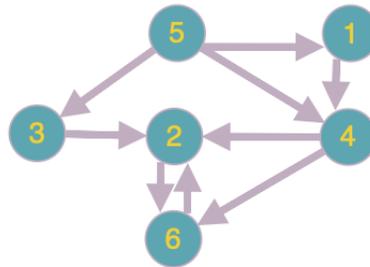
For instance, the adjacency matrix for the graph given in the above figure can be cal-
culated as

$$A = \begin{bmatrix} 0 & 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 1 & 1 & 0 & 1 \\ 0 & 0 & 0 & 0 & 1 & 0 \\ 1 & 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 1 & 0 & 0 \end{bmatrix}.$$

In MATLAB, write the function `reachableVertices` which has a single input argument
(the $n \times n$ adjacency matrix of a graph) and returns a cell array with n components. i-th
component of this cell array must be the set of vertices reachable by the i-th vertex (possibly
in more than one hop). As an example, for the adjacency matrix given above, the output
of your function should be

```
reachableSet{1} = [2    4      6]
reachableSet{2} = [2      6]
reachableSet{3} = [2      6]
reachableSet{4} = [2      6]
reachableSet{5} = [1    2    3    4    6]
reachableSet{6} = [2      6]
```

Notes:

- Your function must be able to work properly with adjacency matrices of any size. Test your program with the 20×20 adjacency matrix A given in the file `adjMatrix.mat`.

- You can use MATLAB built-in functions `find`, `unique` and `setdiff` in your code, if necessary.

- Your function must check whether the input is a valid adjacency matrix or not (it must be a square matrix and contain only ones and zeros) and display an error message if it is not a valid adjacency matrix.

- Do not forget to properly comment your code: use h1 comment line and explain the usage of your function in the comment lines.

- Prepare a project report which includes the following parts: a cover page, problem definition, your solution (pseudo-code of your algorithm), results and discussion. Furthermore, put your MATLAB code in the appendix section of your report.