**MATLAB Programming NYCU Fall 2022 LAB#5 2022/10/18**

For this lab, you will learn to write a MATLAB function. This will be a simple function with several forms, so you get to do input/output argument checking and implement the tasks accordingly.

You will implement a function called **max2d**. Its main task is to find the largest element(s) in a 2-D array. Its various forms are:

1. `v = max2d(A)` % **v** is the largest element in array **A**
   % In this function, simply assign `max(A(:))` to **v**.
2. `[v,n] = max2d(A)` % **n** is the linear index of the largest element
   % In this function, use `[v,n]=max(A(:))`.
   % Only when there are two output arguments (`nargout==2`).
3. `[v,r,c] = max2d(A)` % **r** and **c** are the row and column indices of the largest element.
   % Get **n** first as in #2 and use `ind2sub` to get **r** and **c**.
   % Only when there are three output arguments (`nargout==3`).
4. `v = max2d(A,k)` % **v** is a column vector containing the largest **k** elements in array **A**
   % Simply assign `sort(A(:),'descend')` to **v**.
   % Only when there are two input arguments (`nargin==2`).
5. `[v,n] = max2d(A,k)` % **n** is a column vector of the linear indices of the elements of **v** within **A**
   % Simply use `[v,n]=sort(A(:),'descend')`
   % Only when (`nargin==2`) and (`nargout==2`).
6. `[v,r,c] = max2d(A,k)` % **r** and **c** are column vectors containing the
   % row and column indices of the elements of **v** in **A**.
   % Use `ind2sub` to compute **r** and **c** from **n**, as in #3.
   % Only when (`nargin==2`) and (`nargout==3`)

Notes: You need to do input argument checking: **A** should be a non-empty numeric array, and **k** has to be an integer between **1** and `numel(A)`. Try to do these with `validateattributes`. You check **k** only when `nargin>1`. Also send out error messages if the numbers of input or output arguments are invalid.

Test your function using the following:

```
A = round(100*rand(3,4))
v = max2d(A)
[v,n] = max2d(A)
[v,r,c] = max2d(A)
v = max2d(A,3)
[v,n] = max2d(A,3)
[v,r,c] = max2d(A,3)
v = max2d(A,30)   % should be error
v = max2d([])     % should be error
v = max2d(A,0)    % should be error
v = max2d(A,[])   % should be error
v = max2d(A,1,2)  % should be error
```