TP ° 3 (TABLES & MATRICES)

I. vectors & Matrices

An array allows to store several values at once by being able to access each one in a positional way. For example, the following table provides independent access to each value.

1	2	3	4
5	6	7	8
9	10	11	12
13	14	15	16

To declare this table, simply type:
……

- To access, for example, the value in the third row and second column, type
  ……
- The separation of elements in a line is done by ……..
- The separation of elements in a column is done with ……

tables with one "dimension" called vectors:

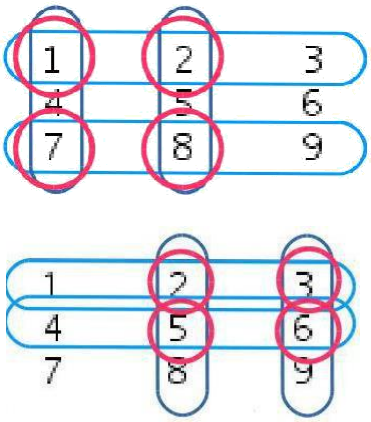
```
>> b=[1 2 3 4]
```

To access the second element for example, type ……

The keyword end allows access to the ……..

- Type a vector composed of the 1st and 3rd element of b
- For the matrix a
  ```
  >> a=[1 2 3;4 5 6;7 8 9]
  ```

give the intersection of rows 1 and 3 with columns 1 and 2; then the intersection of rows 1 and 2 with columns 2 and 3



When we use the operator (**double dot**), to access elements of a matrix, allows all indices of the dimension to be retained.

Witch elements are retained in the following

```
>>a(2,:)
>>a(:,3)
```

Use the (**double dot**), to create a vector with 4 elements from 1 to 4; and a vector with the elements 0 2 4 6 8

Exercise 1 *(Access to items)*

First create the M matrix, from the following command:

```
>>M = magic(10).
```

This command will create a dimension matrix (10x10) with special properties.

1. Create a matrix M1 composed only of the first column of M
2. Create a M2 matrix composed only of the second line of M
3. Create a M3 matrix composed of the first 3 columns of M
4. Create an M4 matrix composed of the last 3 lines of M
5. Create an M5 matrix composed of the intersection of 1st, 5th and 7th lines of M and 2nd, 4th and 8th columns of M

II. Assembly of matrices:

The matrix concatenation allows one or more matrices to be assembled together to create a new matrix. The brackets [] we saw earlier for building tables are also used to carry out concatenation.

For example, the expression C = [A , B] will concatenate horizontally the matrices A and B. While the expression C = [A ; B] will perform a vertical concatenation. The concatenation operation is carried out if the dimensions of the matrices to be concatenated are not compatible , i.e. to achieve a horizontal concatenation, the matrices must have the same number of rows and to achieve a vertical concatenation the same number of columns.

Example:

```
>>A = ones(2, 5) * 6;
>>B = rand(3, 5);
>>C = [A; B]
```

No problem, the 2 matrices have the same number of columns. Try now to make the horizontal concatenation, what happens?

Exercise 2 *(Concatenation)*
Use the ones, zeros and rand functions as well as the matrix concatenation to create a G-matrix of size (3x10) of the following form:

G =

0	0	0	0	0	1	1	1	1	1
1	1	1	1	1	0	0	0	0	0
0.5831	0.4062	0.2354	0.4088	0.9711	0.8083	0.6523	0.2193	0.3891	0.5491

III. Deletion:

Sometimes you may want to delete some rows or columns from a matrix. There are 2 ways to handle this case. The first way is to reassign the variable containing the matrix to the subset that you want to keep.

Exercise.3

- Delete the 5th row of the matrix H

```
>> H = magic(10) %create a matrix (10x10)
```

……..

- Do the same work in a second way (use an empty matrix in the rows or columns that you want to delete). For the matrix I

```
>> I = rand(13) %create matrix (13x13)
```

…….