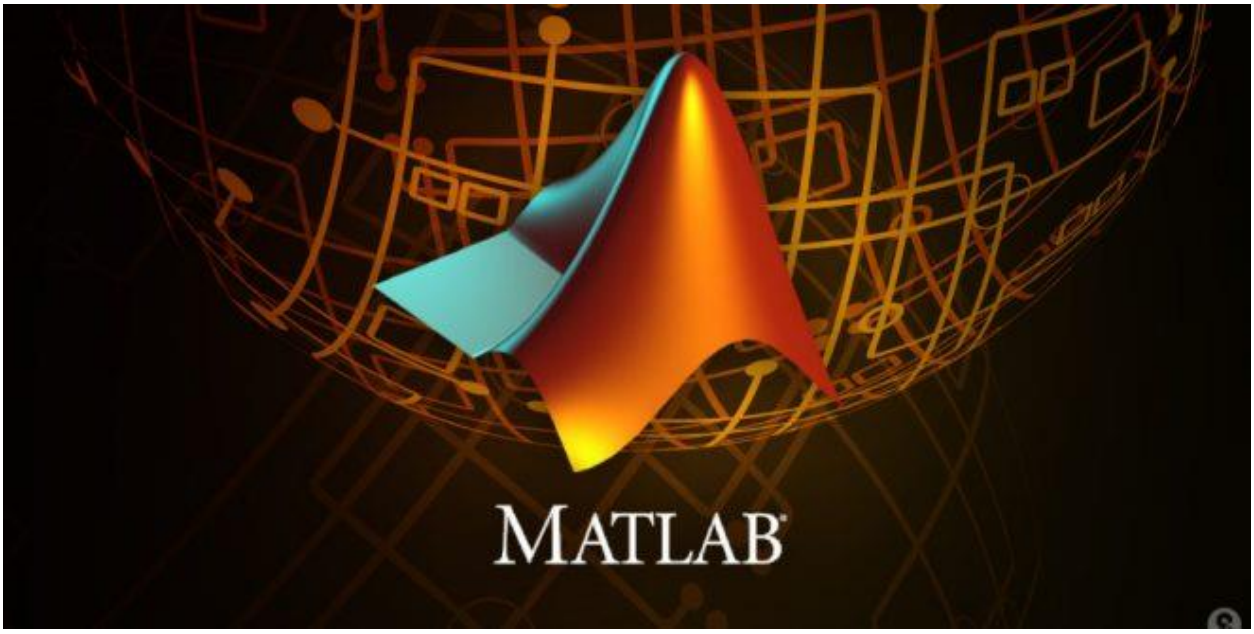
Course N°04

Matrix in

MATLAB



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1.Definition a matrix

A matrix is a surrounded by brackets and may have an arbitrary number of rows and columns; for example, the matrix

$$A = \begin{pmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{pmatrix} \quad (1)$$

To create a such matrix in MATLAB, the following basic conventions must be followed:

- ✓ Separate the elements of a row with spaces or commas ","
- ✓ Use a semicolon ";" to indicate the end of each line or row
- ✓ Surround the entire list of items with square brackets [ ].

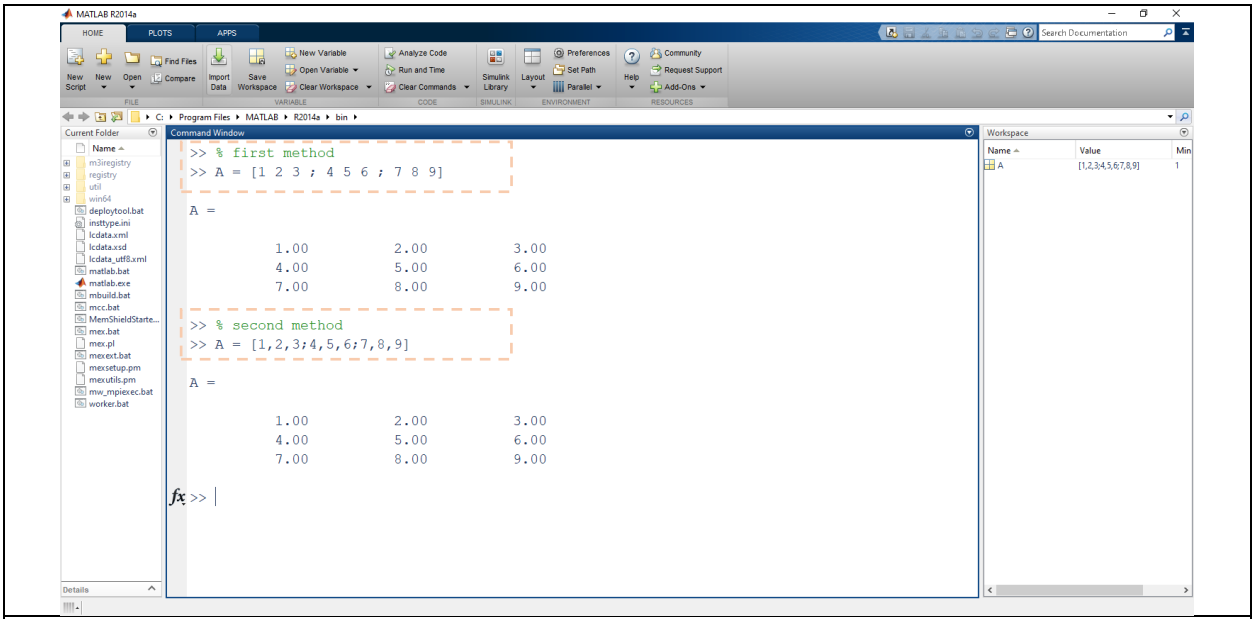

Fig 1. Different methods to create or define a matrix

2.Other useful MATLAB functions

For matrices, to find or extract the highest and/or lowest value or number in the whole matrix, we use the command/function max(.) and/or min(.) two times because these are matrix with two dimensions not one dimension. Otherwise, will indicate the highest values or the lowest values for each column in the matrix.

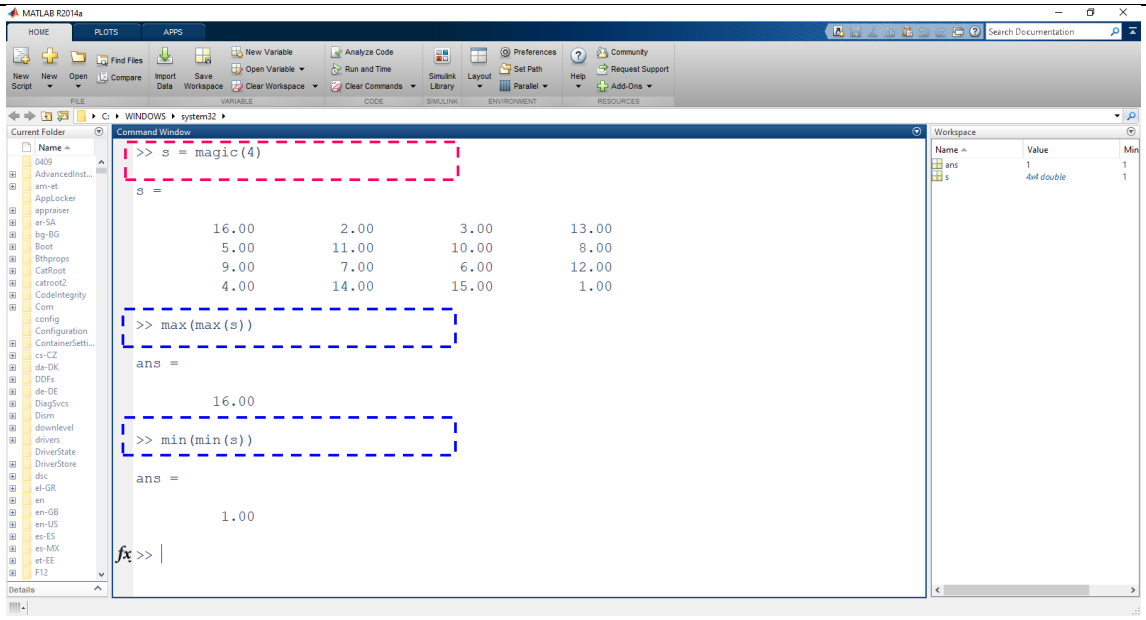

Fig 2. Find the highest and lowest value in the whole matrix

Again, in order to find or evaluate the summation and/or production of such element in the matrix, we use the command/function sum(.) and prod(.)

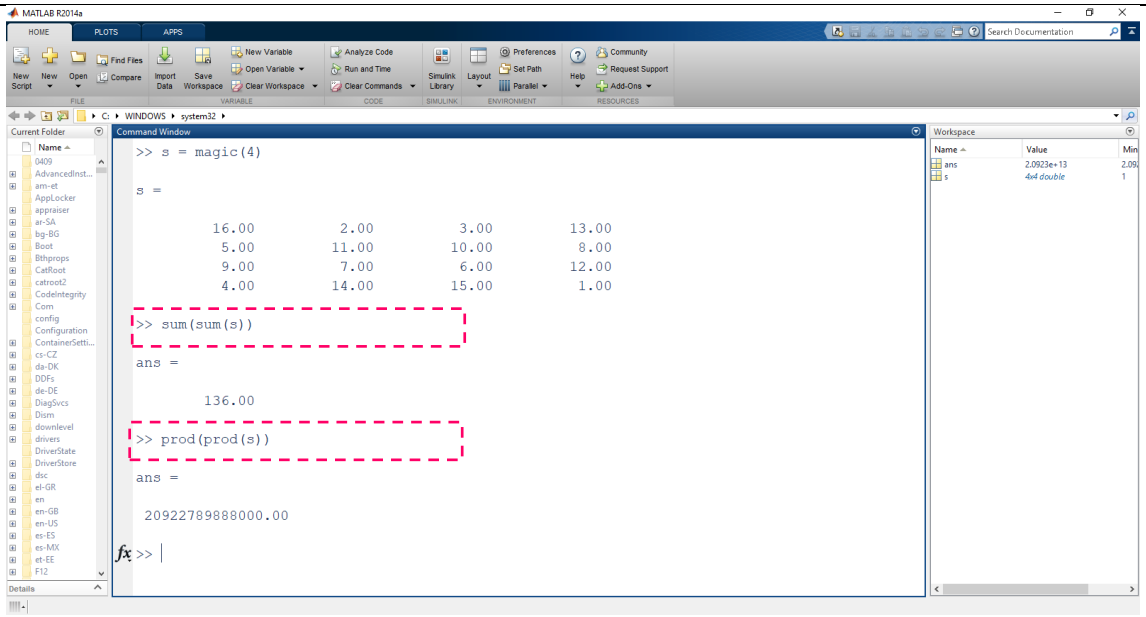

Fig 3. Find the summation as well as the product of the all of element in the whole matrix

The mean of a matrix, also known as the average which equal the sum of the numbers in each row in the matrix divided by the number of rows and then the result will sum again and divided on the number of columns, using the command/function mean(.)

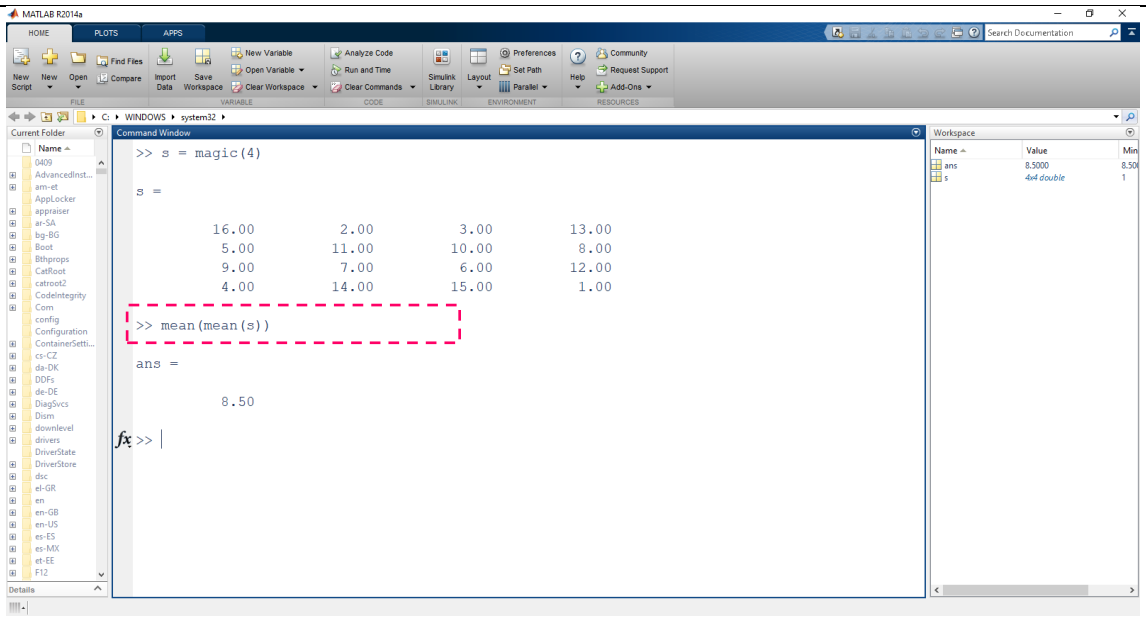

Fig 4. Find the average of the values that contain in the matrix

3.MATLAB output

3.1.The *diag* command

Displaying or to generate a diagonal of a matrix, using the command/function diag(.)

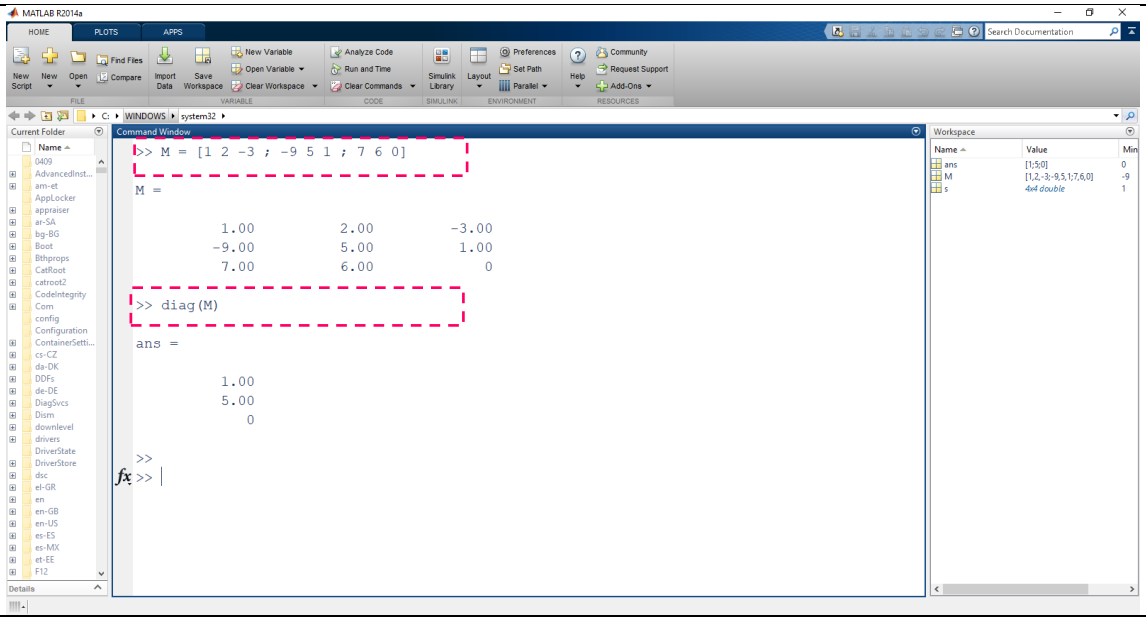

Fig 5. Display the diagonal of the matrix

3.2.The *transpose* and/or ' and/or *transp* command

Transpose a matrix, rows become a columns and columns become rows.

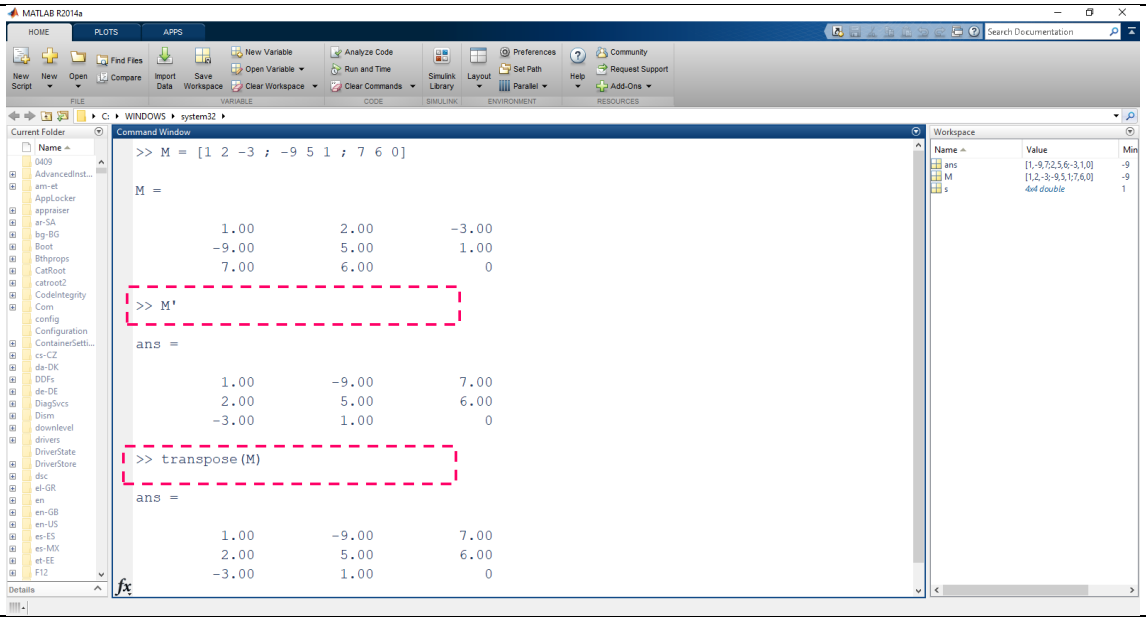

Fig 6. Display the transpose of the matrix

Or

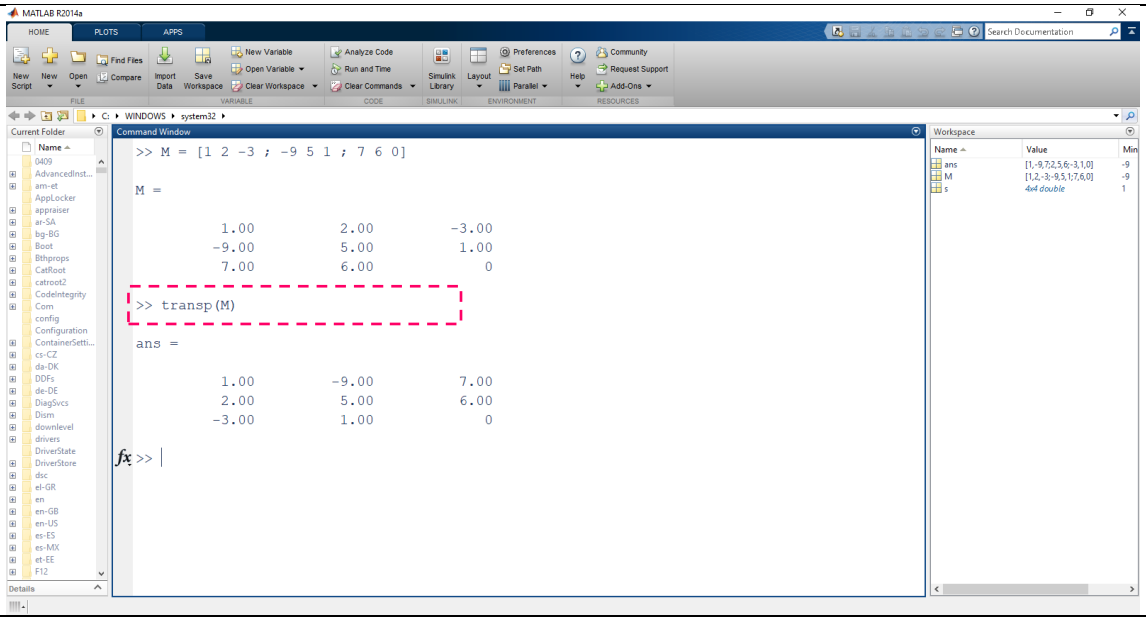

Fig 7. Display the transpose of the matrix another command

3.3.The *inv* command

To display the inverse of such matrix just type the command/function inv(.) and the inverse of the matrix will be printed in the screen

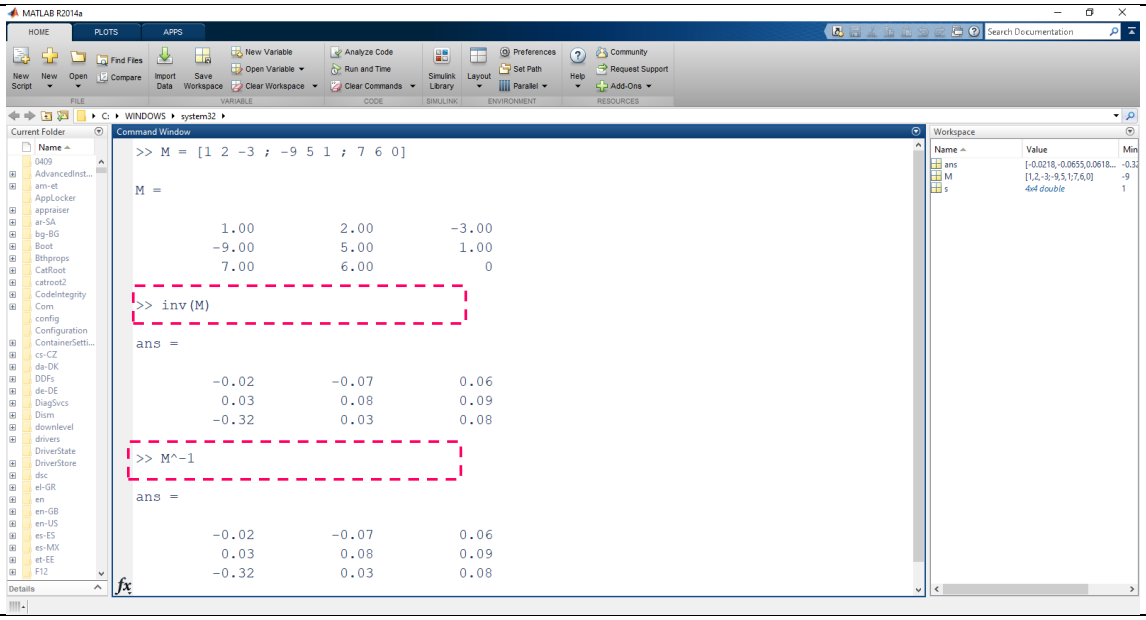

Fig 8. Display the inverse of the matrix

3.4.The *size* command

To display the dimension of a matrix, just type the command/function size(.) and the dimension will be printed in the screen.

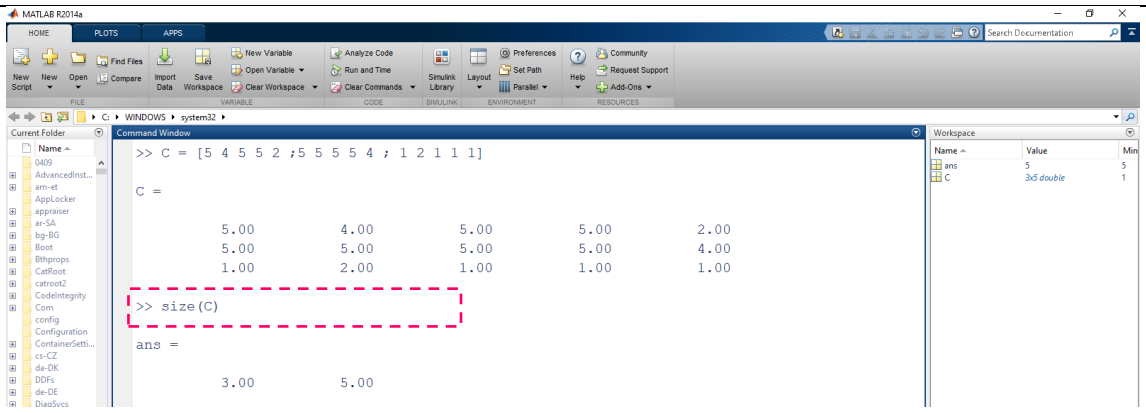

Fig 9. Display the dimension of the matrix

4.Special or particular matrices

In MATLAB, there are functions that automatically generate specific matrices for example containing all ones, zero elements, ones in the diagonal only, arbitrary number.

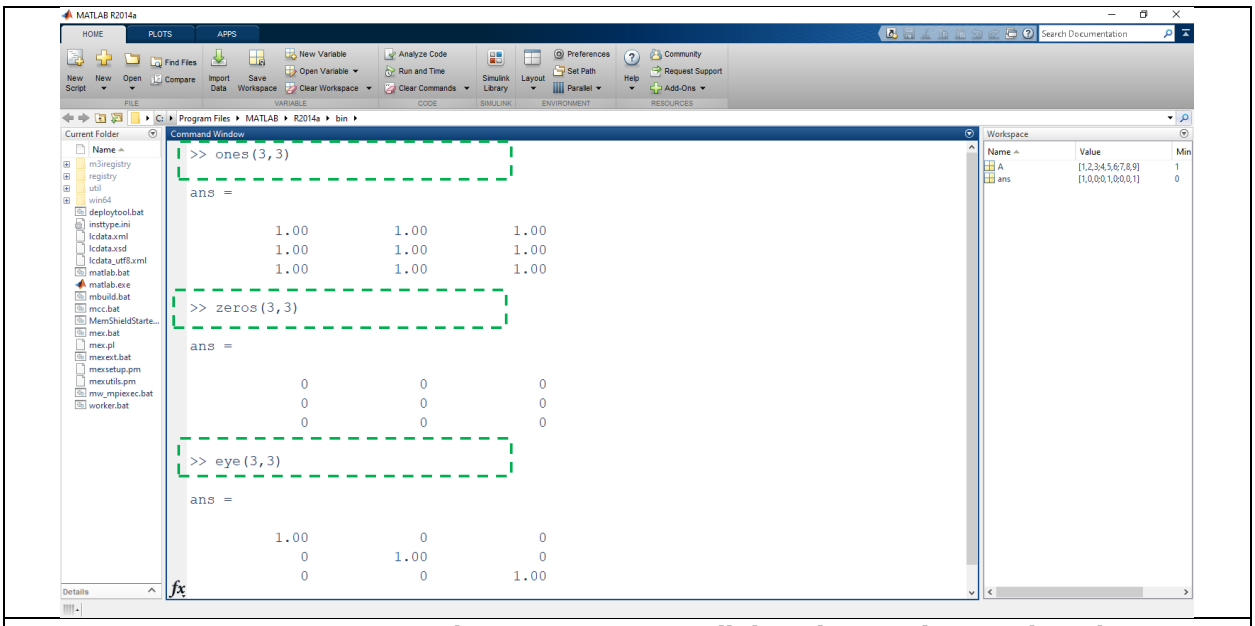

Fig 10. Create a matrix contain number « 1 » or « 0 » in all the column and row and number « 1 » in diagonal only

And

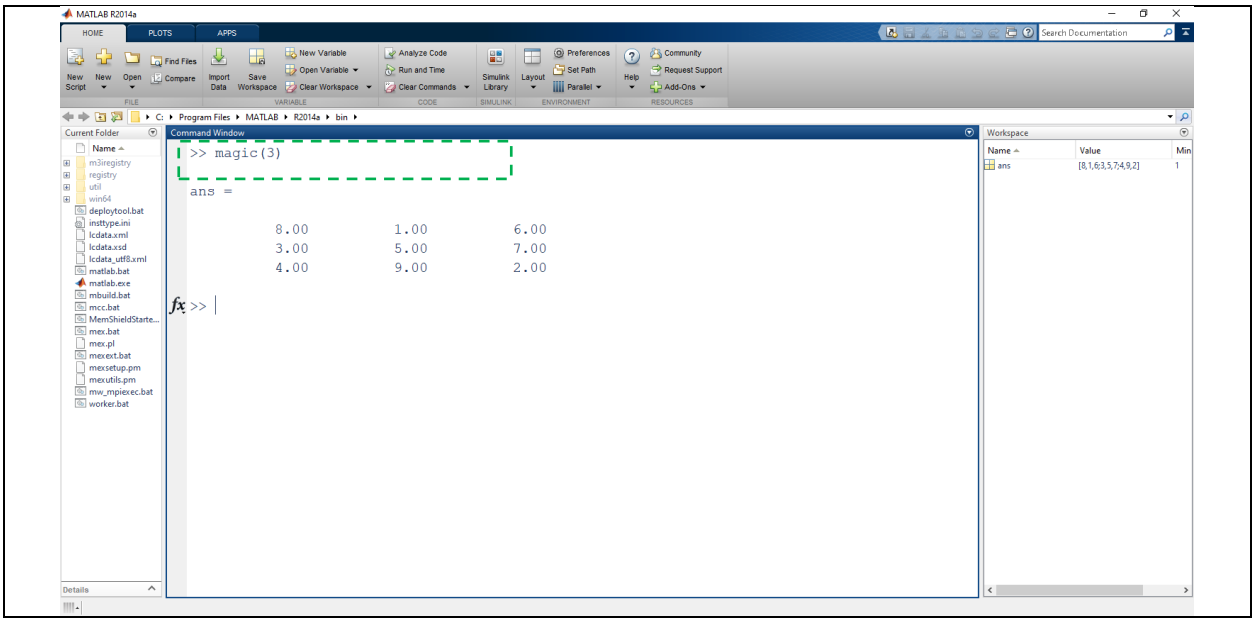

Fig 11. Create a random matrix

5.Matrix and submatrix manipulations

5.1.Pick and/or replace command

To show or peak or extract only one value from matrix already written by MATLAB, we need to know

- ✓ The name of the matrix first,
- ✓ Second, the position of that element in row and column of the matrix

Similarly, to replace one value from matrix, we need to know

- ✓ The name of the matrix
- ✓ Second, specify the position of the element by number of row and column in the matrix
- ✓ Third, give the new number or value

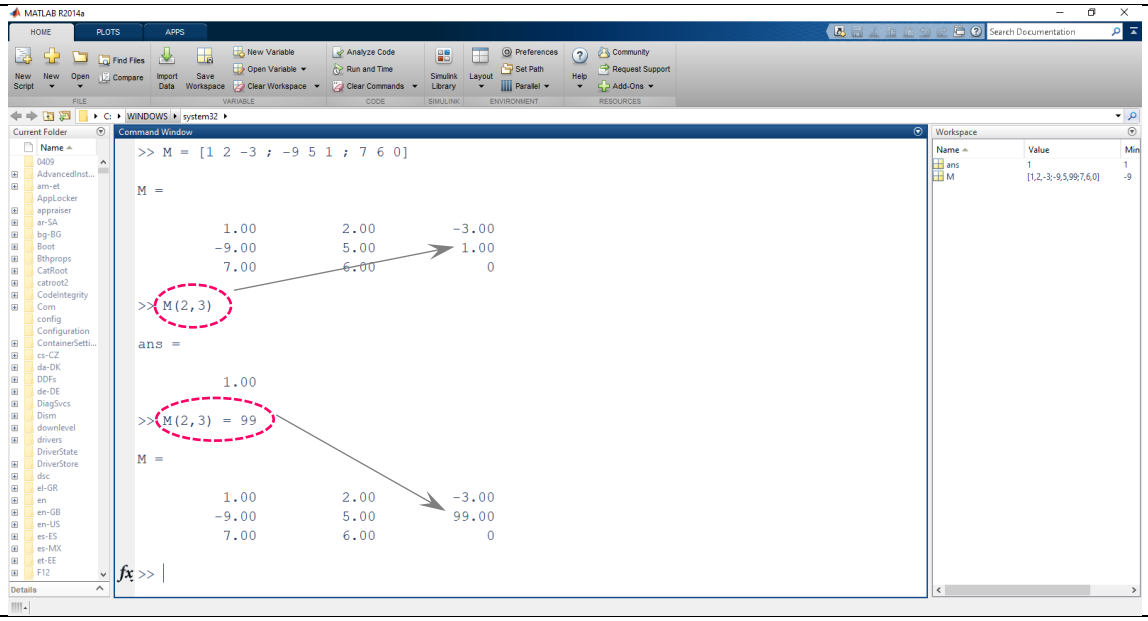

Fig 12. Display or replace such element from a matrix

5.2.Remove a row from a matrix

To remove a row from a matrix already written by MATLAB, we need to know the position or the order of this row in that matrix

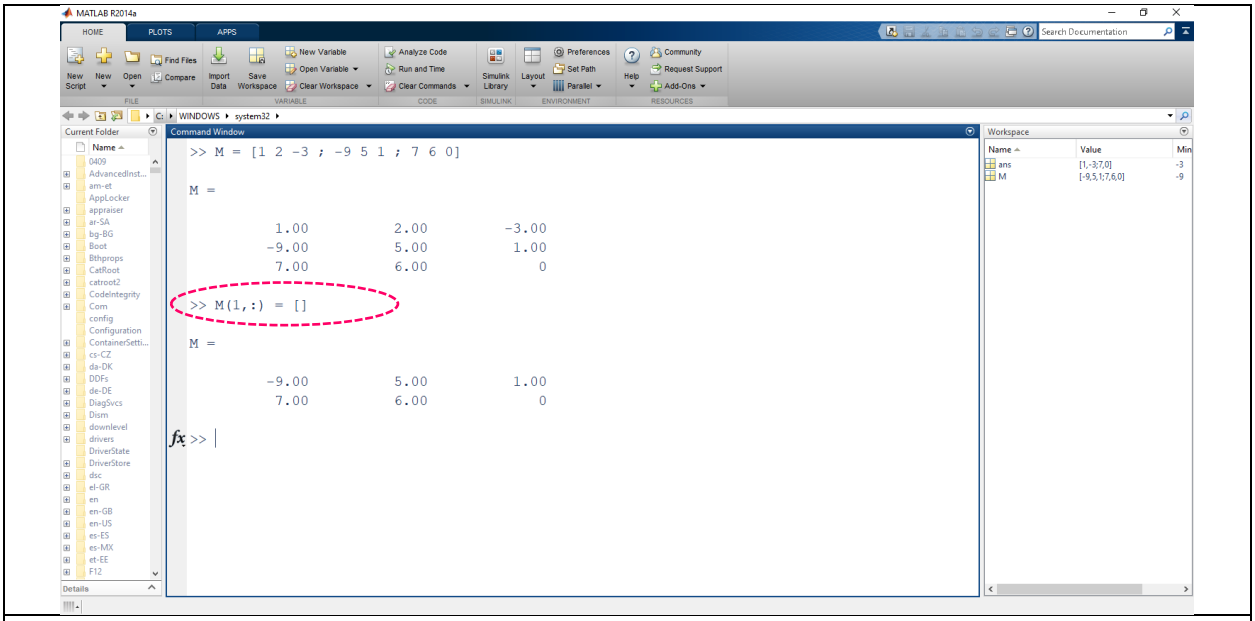

Fig 13. Display how to remove a row from a matrix

5.3.Remove column from a matrix

To remove a column from a matrix already written by MATLAB, we need to know the position or the order of this column in that matrix

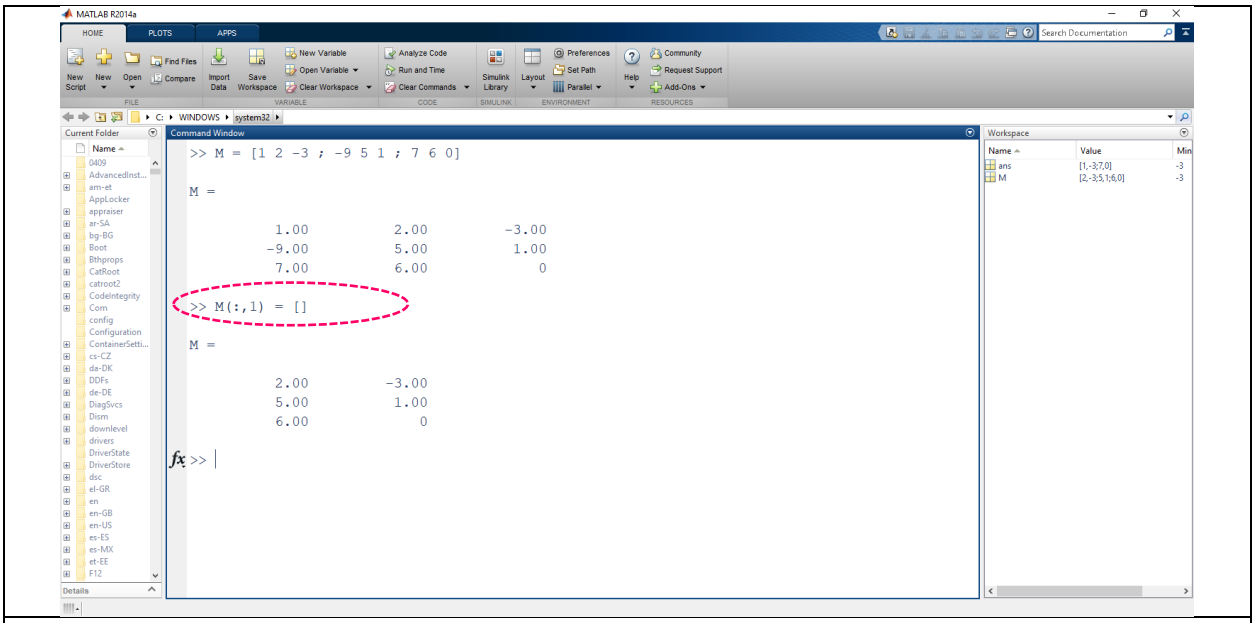

Fig 14. Display how to remove a column from a matrix

5.4. Add a row to a matrix

To add a row from a matrix already written by MATLAB, we need to respect the dimension of the row in the matrix

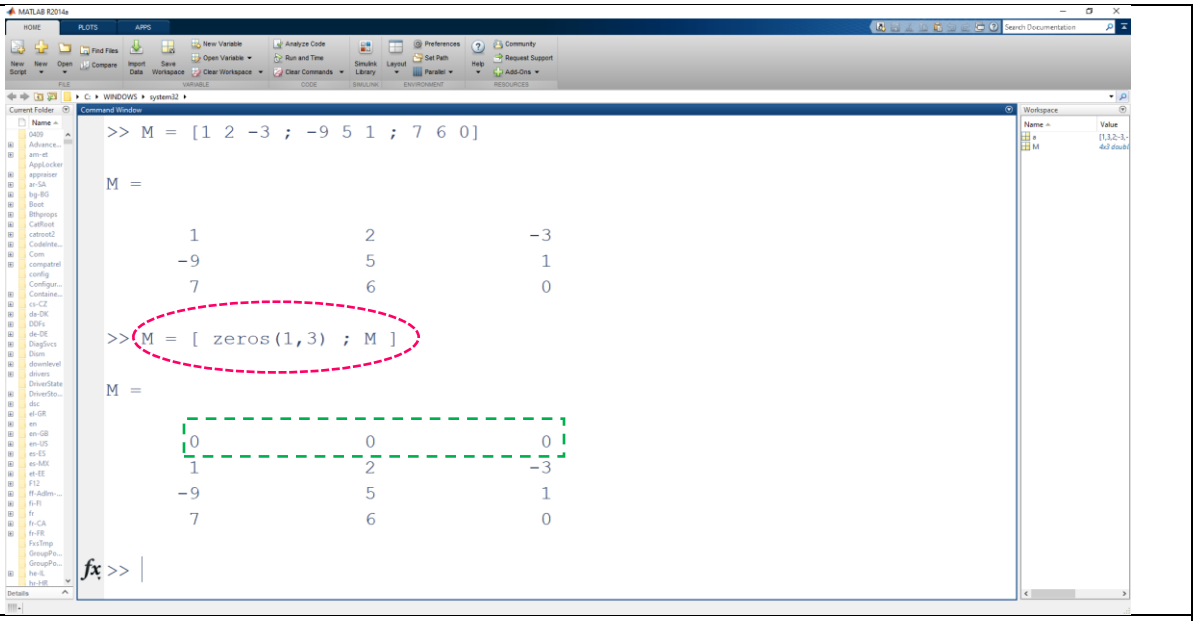

Fig 15. Display how to add a row to a matrix at begin

And

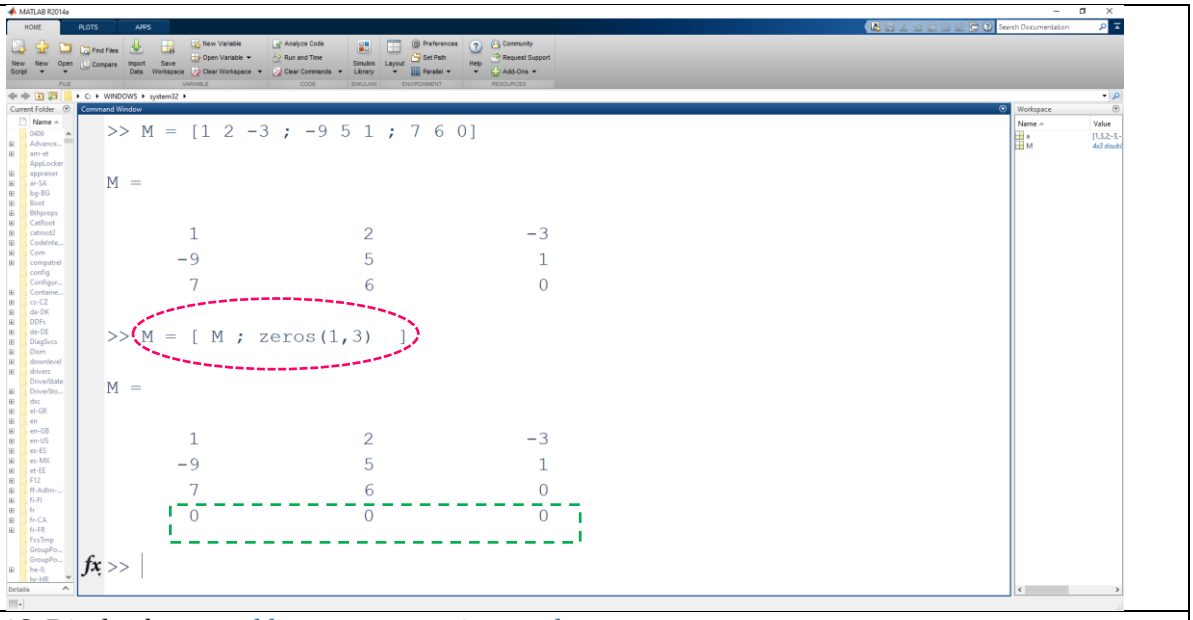

Fig 16. Display how to add a row to a matrix at end

5.3. Add a column to a matrix

To add a column from a matrix already written by MATLAB, we need to respect the dimension of the column in the matrix

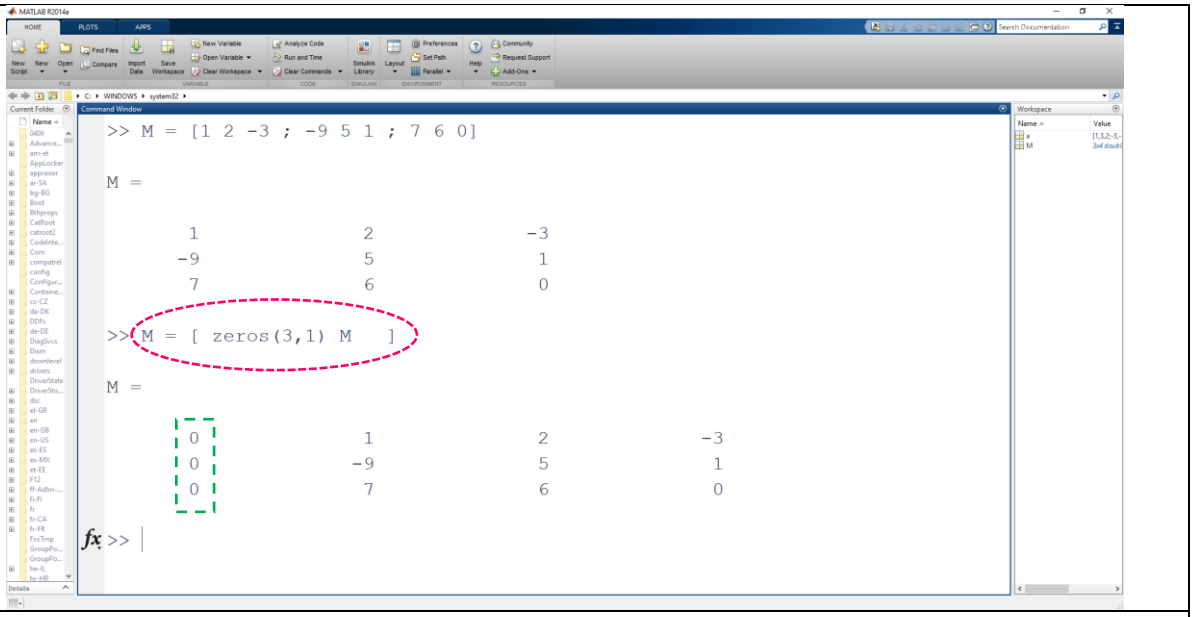

Fig 17. Display how to add a column to a matrix at begin

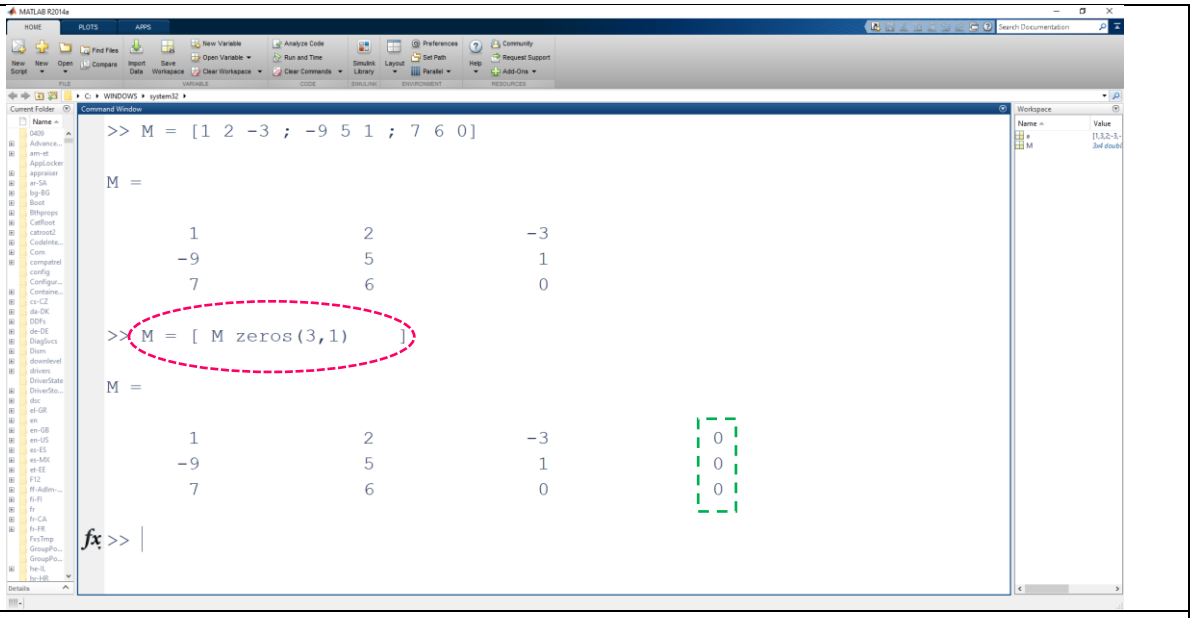

Fig 18. Display how to add a column to a matrix at end

6. List of References

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