University of BATNA 2
Faculty: Mathematics and Computer
Department: Common Core in Mathematics and Computer Science
1st Year CC-MCS 2023-2024 academic year

Series of 6th supervised exercises

Matrices : two-dimensional arrays

Exercise 1

Let Mat be a real matrix of N rows and M columns ($N \leq 50$ and $M \leq 200$). Write an algorithm that determines:

1. The minimum and its position (assumed to exist only once) in the matrix Mat.
2. Count and display the number of zeros in each row of the matrix Mat.
3. Count and display the number of zeros in each column of the matrix Mat.
4. Check for the existence of a given value "X" in the matrix Mat.

Exercise 2

Let M be a square matrix of N × N real numbers ($N \leq 100$). Write an algorithm that fills the matrix M as follows:

0	**1**	**1**	**1**
-1	**0**	**1**	**1**
-1	**-1**	**0**	**1**
-1	**-1**	**-1**	**0**

Exercise3

Write an algorithm that reads a square matrix of integers of order N ($N \leq 100$), then sets its secondary diagonal to 1. (Propose two solutions)

Exercise 4 (optional, if there is time)

Let A be an integer matrix with N Rows and M Columns.
Write an algorithm to :

1. Find the minimum and maximum and their indices in the matrix A.
2. Calculate and display the sum of the elements of the column containing the minimum of matrix A.
3. Calculate and display the product of row elements containing the maximum of matrix A.
4. Calculate and display the average of the row elements containing the positive minimum of matrix A.
5. Calculate and display the average of the elements in the column containing the negative maximum of matrix A.

We consider A as an integer matrix with N rows and M columns ($N \leq 90$ and $M \leq 120$).

Home exercises

Exercise 5

Write an algorithm to display the following triangle of stars:

```
X  X  X  X  X  X  X  X  X
   X  X  X  X  X  X  X
      X  X  X  X  X
         X  X  X
            X
```

Exercise 6

Let A be a square matrix of integers of order N (N≤90).

1. *Write an algorithm to :*
2. *Check whether the matrix A is an identity matrix or not.*
3. *Check whether the matrix A is symmetrical or not.*
4. *Check whether matrix A is upper triangular or not.*
5. *Check whether matrix A is lower triangular or not.*
6. *Check whether the matrix A is a magic square or not..*

> *A magic square of order N is a square matrix of order N such that: the sum of the integers of each row, each column, the diagonal and the anti-diagonal are identical (equal).*

Exercise 7

Write an algorithm to construct Pascal's triangle.
Example: For a matrix (6,6)

1					
1	1				
1	2	1			
1	3	3	1		
1	4	6	4	1	
1	5	10	10	5	1

Exercise 8

Let A be an integer matrix with N, Write an algorithm to :

1. Determine and display the sum of each row of matrix A.
2. Determine and display the sum of each column of matrix A.
3. Determine and display the index of the row of matrix A whose sum of its elements is minimal.
4. Determine and display the index of the column of matrix A whose sum of elements is maximal.

> *In Exercises 8, we consider A as an integer matrix with N rows and M columns (N≤100 and M≤80).*