Exercises - Problems Sheet # 1: One/Two Dimensional Arrays

No. Of Questions: 15 **No. Of Pages: 2**

- **To be submitted during the Labs of week 5 (Starting on Saturday the 7th of March).**
- **Students will lose 2 marks if this homework is not delivered on time or found out to be copied.**
- **The submitted solutions should be handwritten and NOT typed/printed.**

Answer the following:

1) Write a C program that calculates the maximum, the minimum, and the average of 10 numbers entered by the user and stored in an array.

2) Write a C program that reads 10 characters from the user, and then searches for the position of the character z.

3) Write a C function that checks if an array is in an ascending order.

4) Write a C program that reads 10 integer numbers from the user, and then the program should calculate the sum of the odd numbers, and the sum of the even numbers.

5) Write a C program that asks the user to enter 10 integers in an array. The program will then display (based on the entered numbers) one of the following messages:

- "the numbers in the array are increasing",
- "the numbers in the array are decreasing",
- "the numbers in the array are not changing", or
- "the numbers in the array are increasing and then decreasing."

6) Write a C program that reads a matrix (3×4), and asks the user to choose a number, and then displays the position of the selected number if found, otherwise it displays "number not found."

7) Write a C program to read a matrix from the user, and then display the row with the maximum total/sum *(that is, the row whose sum of elements is maximum)*.

8) By using a two-dimensional array, write a C program to display the matrix shown below:

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

9) By using a two-dimensional array, write a C program to display a Pascal triangle of any size. In a Pascal triangle, the first & second rows are set to 1. Each element of the triangle (starting from the third row downwards) is the sum of the element directly above it and the element to the left of the element directly above it. ***See the following example of a Pascal triangle (with a size = 5):***

1
1 1
1 2 1
1 3 3 1
1 4 6 4 1

10) Write a C function that reverses an array in another one.

11) Write a C function that reads the number of students in a class, and five grades for each student. The function should then compute the average grade for each student.

12) Write a C function that checks if a matrix is sparse or not. Given that a sparse matrix is a matrix in which most of the elements are zero *(that is, the number of zero-valued elements are more than 50% of the total number of elements).*

13) Write a C function that reads a matrix and checks whether the given matrix is a symmetric matrix or not. Given that: If a square matrix A is equal to its transpose A^T, then it is a symmetric matrix. For example: if the elements of the matrix are:

1	**2**	**3**
2	**4**	**5**
3	**5**	**8**

Then the matrix is symmetric

14) Write a C program that reads the radius of a circle, and then calls a function that returns the circumference and the area of that circle. The program should include a global constant variable.

15) Write a C program that reads a 1-D array of any size, then calls a function that returns the following:

- The maximum value in the array.
- The minimum value in the array.
- The average value of the array.

With our best wishes;