Hacettepe University
Department of Electrical and Electronics Engineering
ELE122 - Computers And Programming Laboratory

03.05.2021

# Experiment 4

**Q1)** If the vector $\mathbf{x} \in \mathbb{R}^n$, then the **norm** of the vector **x** is defined as the length or magnitude of the vector and usually denoted by enclosing it within double vertical lines, $\|\mathbf{x}\|$.

The commonly used norms are as follows:

- Absolute-value norm (The absolute sum of all $n$ elements):

$$\|\mathbf{x}\|_1 = \sum_{i=1}^{n} |x_i|$$

- Euclidean norm:

$$\|\mathbf{x}\|_2 = \sqrt{\sum_{i=1}^{n} {x_i}^2}$$

- Maximum norm (The maximum value of all $n$ elements):

$$\|\mathbf{x}\|_\infty = \max(|x_1|,\cdots,|x_n|)$$

Write a C program that calculates the vector norms defined above. The program asks the user to the size of vector **x**. The user needs to enter the elements of vector **x.** You have to write **three functions** for calculating norms and then call these functions from the main program. An example output of the program is as follows:

```
Enter the size of vector x: 4
Enter the elements of x: 1 2 3 -8

The vector x : 1 2 3 -8
--------------------------------
The absolute-value norm of x : 14
The Euclidean norm of x : 8.8318
The maximum norm of x : 8
--------------------------------
```

**Q2)** In this question, you are expected to use **pointers**. Your program must:

- Take an array of desired length from the user as input.
- Generate a new array which is the reverse of the input.

and your program must have an output as follows:

```
The length of input array: 3
***********          ***********
Please enter the value 1: 1
Please enter the value 2: 10
Please enter the value 3: 100

The input array --- The output array
      1        ---       100
      10        ---       10
      100        ---       1
--------------------------------
```