University of Biskra
Mathematics Department
Module: Algorithms and Data Structures 2
1st year 2023/2024

# TD N° : 04

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**Exercise 1:**

Write an algorithm that allows to:

1. Declare pointers to: an integer, a real number, a character, a "Student" record composed of the following fields: Registration number, Last name, First name and Average;
2. Then Read and Write data that corresponds to the variables pointed to by these pointers.

**Exercise 2 (Optional):**

1. Write an algorithm that uses the notion of a pointer to read two integers and calculate their sum.
2. The same previous question but use a function with passes by address.

**Exercise 3 (Optional):**

Consider that the following declaration:

```
int a;
char tab[10];
```

Rewrite the following instructions with or without the use of pointers.

1. * tab
2. * (tab + 0)
3. ( * tab ) + 1
4. & ( tab [ 0 ] )
5. & ( tab [ i ] )

**Exercise 4:**

Write an algorithm in which you must declare a static array *tab* of integers. Then fill and display its contents using pointers.

**Exercise 5 (Optional):**

Write an algorithm that allows filling and sorting a dynamic array using pointers managing memory addresses.

**Exercise 6: (Linear linked lists)**

Consider the following data structure:

```
Type list = record
                el : type_element ;
                next : ↑ list;
            end ;
```

Write the following procedures:

1.

Procedure insert_begin (v : type_element ; var L : ↑list) ;

**// which inserts an element v at the beginning of the list L**

2.

Procedure insert_end(v : type_element ; var L : ↑list) ;

**// which inserts an element v at the end of the list L**

3.

Procedure delete_begin (var L: ↑list) ;

**// which delete an element from the beginning of the list L**

4.

Procedure delete_end ( var L : ↑list) ;

**// which delete an element from the end of the list L**

5.

Procedure delete (v:type_element ; var L:↑list) ;

**// which deletes an existing element v, from the list L**

6. Use the previous operations to write a procedure for transferring the elements of an array T of N reals into a linear list L.