Mila University center
Institute of Mathematics and Computer Science
Department of Mathematics
1st Year LMD Mathematics

DIRECTED WORK SERIES NO. 4

Algorithms and data structures 2 Academic year: 2023 / 2024

Exercise 1

Give the declaration of the following linked lists:

1) List of **reals**.
2) List of **points** where each point is represented by two coordinates.
3) List of **nations** where each nation is represented by their name, their date of creation, and surface, and the number of population.

Exercise 2

Write an algorithm that reads *N integers* and inserts (adds) them into an empty linked list and then determines the maximum value of this list.

Exercise 3

Write the modules on the following linked lists of integers :

1) ***Is_empty :*** used to check whether a linked list is empty (Nil) or not.
2) ***First*** : which returns the first element of a linked list.
3) ***Show*** : used to display the elements of a linked list.
4) ***Sum*** : used to calculate the sum of the elements of a linked list.
5) ***Length*** : used to calculate the number of elements in a linked list.

Exercise 4

Write the recursive modules on the following linked lists of integers:

1) ***Sum:*** which returns the sum of the elements of a linked list.
2) ***Max:*** which returns the maximum of a linked list.
3) ***Belongs:*** used to check whether an element exists in a list or not.
4) ***nb_occurrences*** : allowing you to count the number of occurrences of a value x.

NB : Directly use the ***first*** function (which returns the first element of a list) and the ***rest*** *function* (which returns the list without its first element) current view.