University Mohamed Khider-Biskra
Computer Science Department

1st year Computer Science Degree — TD ADS2
Exercises Serie N°3

Linked Lists

Consider the following data structure (linked list) :

```
Type
    linked_list = Record
                      el : element_type ;
                      Next :↑ linked_list ;
                  End ;
    List =↑ linked_list ;
```

Write the following procedures :

1. **Procedure** insert_begin(v : element_type ; **var** l : *List*) ; which insert an element v at the beginning of the list l.
2. **Procedure** insert_end(v : element_type ; **var** l : *List*) ; which insert an element v at the end of the list l.
3. **Procedure** delete_begin(**var** v : element_type ; **var** l : *List*) ; which delete the first of a list l. v will contains the value of the deleted element.
4. **Procedure** delete_end(**var** v : element_type ; **var** l : *List*) ; which delete the last element of the list l. v will contains the value of the deleted element.
5. Use the previous operations to accomplish :
   (a) a procedure to transfer the elements of an array T of N real numbers into a linked list L.
   Procedure array2list(T : array $[N]$ of real ; **var** L : *list*) ;
   (b) a procedure of a reverse transfer (list to array).
   Procedure list2array(**var** L : *list* ; **var** T : array $[N]$ of real) ;
   (c) a sub-program to sort a list L.
   (d) a sub-program to merge two ordered lists L_1 and L_2 in a third list L which will be also sorted.
6. Let L be a sorted linked list. Write :
   (a) **Procedure** insert(v : element_type ; **var** L : *list*) ; which insert the value v in the list L so that the list remains sorted.
   (b) **Procedure** delete(v : element_type ; **var** L : *list*) ; which deletes v from the list L.