MINIA UNIVERSITY
FACULTY SCIENCE
Department of Computer Science
Data Structures Using Python

Exercises #7
Linked List

7.1 Create a class, named ***SinglyLinkedList***, which has a ***constructor*** that initializes its members, **_head** to ***None*** and **_size** to ***0***, and supports the following operations:

is_empty(), which returns True if the list is empty, otherwise returns False.
len(), which returns the number of elements in the list
add_first(), which adds an element at the head of the list.
add_last(), which adds an element at the end of the list.
remove_last(), which removes the element at the end of the list, and raises Empty exception if the list is empty.
remove_first(), which removes the element at the head of the list, and raises Empty exception if the list is empty.
display(), which displays the elements of the list
contains(), which returns True if the list contains an item, otherwise returns False.
insert_before(), which adds an element before a given item, if exists.
insert_after(self), which adds an element after a given item, if exists.
remove_item(), which removes a specific item, if exists.

Note that the ***SinglyLinkedList*** class nodes are stored in class **_Node**, which is defined as follows:

```
class _Node:
    def __init__(self, element, next): # initialize node's fields
        self._element = element        # reference to user's element
        self._next = next              # reference to next node
```

7.2 Using the class ***SinglyLinkedList***, write a method ***ConcatLists()*** that concatenates two given linked lists, and returns the resulted list. Then, write a program that creates two linked lists, uses the method ***ConcatLists()*** to concatenate then then displays the elements of the new list.

7.3 Implement a ***LinkedStack*** class that inherits from the ***_DoublyLinkedBase*** class. Then, write a program that tests this class.

7.4 Implement a ***LinkedQueue*** class that inherits from the ***_DoublyLinkedBase*** class. Then, write a program that tests this class.

7.5 Repeat Exercises #6 using ***LinkedStack*** & ***LinkedQueue*** classes instead of ***ArrayStack & ArrayQueue Classes***.