WIA1002/WIB1002 Data Structures

Lab: Linked List

Question 1

1) Write the generic Node class consisting of two components of a node (i.e.: element, next), with a default construct and a constructor that accepts an item assigned to the initially declared element variable.

2) Write a class called MyLinkedList. The class should have the following :
   a. Default constructor
   b. Nodes for head and tail

3) Implement the following methods from tutorial in this class:
   a. `public void addFirst(E e)`
   b. `public void addLast(E e)`
   c. `public void add(int index, E e)`
   d. `public E removeFirst()`
   e. `public E removeLast()`
   f. `public E remove(int index)`

4) Expand the MyLinkedList by implementing the following methods:

Methods	Description
`public void add(E e)`	Return nothing, but adds an element to the list
`public boolean contains(E e)`	Return true if list contains the element e
`public E get(int index)`	Return element at the specified index
`public E getFirst()`	Return the value of the first item
`public E getLast()`	Return the value of the last item
`public int indexOf(E e)`	Return the index of the head matching element in this list. Return -1 of no match
`public int lastIndexOf(E e)`	Return the index of the last matching element in this list. Return -1 of no match
`public E set(int index, E e)`	Replace the element at the specified position in this list with the specified element
`public void clear()`	Clear the list
`public void print()`	Print all the elements in the list
`public void reverse()`	Print all elements in reverse order

5) Write a test program called TestLinkedList that creates a list from MyLinkedList class. Using the methods in (3) and (4), do the following:
   a. Append the following : a, b, c, d, e
   b. Print all the elements in the list.
   c. Reverse all the elements in the list.
   d. Retrieve the number of elements in the list.
   e. Retrieve the first and last value.
   f. Delete the middle value.
   g. Retrieve the index location for the second and third value.
   h. Checks if the list has the value 'c'.
   i. Replace the items individually with the following: h,e,l,l,o.

Question 2

A method called getMiddleValue() returns the value of the middle element of a linked list. The method signature is given as follows :

```
public E getMiddleValue()
```

Write the codes for the getMiddleValue().