

**CMPUT 115 Section B2  
Term Test 2**

March 12, 2001

Instructions:

- This is a closed book, no notes exam.
- Try to put all of your answers in the space provided.
- There are some blank pages at the end of the booklet for use as scrap paper.
- Please do not open the exam until you are instructed to do so.
- Good luck.

First Name:

Last Name:

1. [10 Marks] Why would a SinglyLinkedList not be used to implement a Queue?

2. [15 Marks] What is the time complexity of the following code fragment? Express your answer as a function of **N**, and be as exact as you can be.

```
CircularList list = new CircularList();
for ( int i = N; i > 0; i-- )
    list.addToTail( new Integer(i) );
while ( !list.empty() )
    list.removeFromTail();
```

3. [15 Marks] What output would the following code produce? Some of the source code for the DoublyLinkedListElement class can be found at the end of this exam booklet.

```
DoublyLinkedListElement elm = new DoublyLinkedListElement("C");
elm.setNext( new DoublyLinkedListElement("A") );
elm.next().setNext(new DoublyLinkedListElement("B", null, elm));
DoublyLinkedListElement tmp =
    new DoublyLinkedListElement("E", elm.next(), elm);
elm.setNext( tmp );
elm = new DoublyLinkedListElement("F", elm, null);

while ( elm != null )
{
    System.out.println( elm.value() );
    tmp = elm;
    elm = elm.next();
}
while ( tmp != null )
{
    System.out.println( tmp.value() );
    tmp = tmp.previous();
}
```

4. [15 Marks] How many calls to the String class's *compareTo* method will be made when the following code fragment is executed? Put your answer to the right of the code.

```
OrderedVector v = new OrderedVector();  
v.add( "D" );  
v.add( "C" );  
v.add( "E" );  
v.add( "B" );  
v.add( "A" );  
v.add( "F" );
```

5. [20 Marks] The characters in an array form a palindrome if they read the same from left to right as they do from right to left. For example, here are three palindromes:

1. ABCDCBA
2. FFGGFF
3. Q

Write a method that uses a *stack* and returns true if the characters in an array form a palindrome and false if they do not.

```
public static boolean isPalindrome( Character[] anArray ) {  
    // post: return true if the characters in the given array  
    //         form a palindrome and false otherwise.
```

6. [15 Marks] Complete the following implementation of SinglyLinkedListIterator class's *hasMoreElements* and *nextElement* methods.

```
class SinglyLinkedListIterator implements Iterator
{
    protected SinglyLinkedListElement current;
    protected SinglyLinkedListElement head;

    public boolean hasMoreElements()
    // post: returns true iff there are unvisited elements
    {

    }

    public Object nextElement()
    // pre: hasMoreElements()
    // post: returns value and advances iterator
    {

    }
}
```

**Some source code from the structure package.**

```
public class DoublyLinkedListElement {
    protected Object data;
    protected DoublyLinkedListElement nextElement;
    protected DoublyLinkedListElement previousElement;

    public DoublyLinkedListElement(Object v,
                                   DoublyLinkedListElement next,
                                   DoublyLinkedListElement previous) {
        // post: constructs new element with list
        //       prefix referenced by previous and
        //       suffix referenced by next
        data = v;
        nextElement = next;
        if (nextElement != null)
            nextElement.previousElement = this;
        previousElement = previous;
        if (previousElement != null)
            previousElement.nextElement = this;
    }

    public DoublyLinkedListElement(Object v) {
        // post: constructs a single element
        this(v,null,null);
    }

    public void setNext(DoublyLinkedListElement next)
    // post: sets value associated with this element
    {
        nextElement = next;
    }

    // etc ...
} // end of DoublyLinkedListElement
```

Student Id Number: \_\_\_\_\_

**Extra paper for rough work**

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**Extra paper for rough work**