

Gebze Institute of Technology
Department of Computer Engineering
CSE 241/CSE501
Object Oriented Programming
Fall 2013
Homework # 7
Templates and Polymorphism
Due date December 19th 2013 by 23:59

Design an abstract templated class for a List. This class should include at least the following functions

- A function for adding a new element
- A function for removing an element
- A function for searching an element
- A function for returning the number of elements
- A function for accessing an element by index, for example `object.at(3)`.
- Overloaded `+=` operator for adding another List to this List. This should be a concrete function.
- Overloaded binary `+` operator for returning a new List which is the union of two parameters
- Overloaded binary `%` operator for returning a new List which is the intersection of two parameters
- Overloaded `<<` operator to write the contents of the List to an ostream. This should be a concrete function.

Derive two new templated classes from the class List.

The first class is SortedList which keeps the list always increasingly sorted.

The second class is UniqueList which keeps only one copy of the same element. In other words, this list behaves like a set.

You should not use any STL classes in your program. Your functions should throw exceptions when appropriate.

Test your classes and each of the functions at least 3 times with different cases. You should include cases where SortedList and UniqueList are used in the same function call such as

```
SortedList<int> s1;  
UniqueList<int> s2;  
s1 += s2;
```

Write a small report which lists the functions that uses polymorphism and how polymorphism is used.

Notes:

- Use namespaces, indent your code
- Use separation of interface and implementation

- You should strictly follow the homework submission details and email your homework to the TA.