

The objective of this lab is to:

Understand and implement class templates.

Instructions!

1. Strictly follow good coding conventions (commenting, meaningful variable and functions names, properly indented and modular code.
2. Save your work frequently. Make a habit of pressing **CTRL+S** after every line of code you write.

Task 01:

[20 Marks]

A set is the mathematical model for a collection of things, a set contains elements or members, which can be objects of any kind: numbers, symbols, points in space, lines, entities other geometrical shapes, variables, or even other sets. Your task is to create a Set ADT. Use the standard mathematics definition of set and include the following operations:

- a) `void insert(T item);` // to insert an item into the set.
- b) `void remove(T item);` // to remove the given item from the list.
- c) `bool isMember(T item);` // returns true if the given item is a member of the set, false otherwise.
- d) `Set<T> union(const Set<T>& lhs, const Set<T>& rhs);` // returns the union of two given sets.
- e) `Set<T> intersection(const Set<T>& lhs, const Set<T>& rhs);` // returns the intersection of two given sets.
- f) `bool operator==(const Set<T>& rhs)` // to check whether two sets are equal or not.
- g) `bool isSubset(const Set<T>& rhs);` // returns true if rhs is subset of this set, false otherwise.

Apart from these operations implement constructors, destructors and setters/getters. Write proper main() function to check the functionality of Set class. Demonstrate the working of your Set class for the set of integers, doubles, Rectangles and Students or other objects that you have made previously as part of your lab tasks. Include the header file of respective class and create its set.

Task 02

[10 Marks]

Create a template class *Calculator* which can perform following operations.

- Add
- Subtract
- Multiply
- Divide
- Factorial

The class should have a two data members: result and opCode (to hold which operation to perform). Implement proper constructor, destructor, accessor and mutator functions.

Task 03

[10 Marks]

Use the MyArray class template that we implemented during our lecture. Add a member function *sort()* which should sort the array elements either in ascending order. Specialized this function for strings where you can sort the strings in the array in alphabetical order.

Note: For this task you may get MyArray class code from following path:

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