CSI 2372 – Lab Task 1

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Object Oriented Design basics in C++

Your first task in this lab is to get yourself familiarized with object-oriented design in C++, constructors, and copy constructors. Make sure you have C++ installed, and you are familiar with the header files, and coding files. If you need help, ask your TA to help you with this.

Then, you should do the following programming task. Each programming task in the lab is a design based on the subjects you learned during lectures. There is a test code that you can use to test your design. If you have questions, ask your TAs.

Design a class for the concept of set of integers. Consider that each set in your design has at most 1000 elements. Recall that sets cannot have repeated elements.

Your class must have the following methods. Use the name as they are in the table to be able to use the test file for testing your class design.

Class Set	
Method	Description
Set	The default constructor that initializes the set into an empty set.
Set	The copy constructor
cardinality	Returns the number of elements in the set
add_element	Adds an element into the set
remove_element	Removes an element from the set
is_member	Checks if an element is in the set
equal	Checks if two sets are equal
subset	Checks if a set is a subset of another set
union	Takes the union of two sets and returns the result
intersection	Takes the intersection of two sets and returns the result
difference	Takes the difference of the current set from the given set
mutual_difference	Calculates the mutual difference of the current set and the given set

Recall that

Subset

$A \subseteq B$ if and only if $\forall x \in A \rightarrow x \in B$

Example: $A = \{1, 4\}$ $B = \{1, 2, 4, 10\}$

Union

$A \cup B = \{x \mid x \in A \; or \; x \in B \}$

Example: $A = \{1, 4, 5, 6\}$ $B = \{1, 2, 4, 10\}$ $A \cup B = \{1, 2, 4, 5, 6, 10\}$

Intersection

$A \cap B = \{x \mid x \in A \; and \; x \in B \}$

Example: $A = \{1, 4, 5, 6\}$ $B = \{1, 2, 4, 10\}$ $A \cap B = \{1, 4\}$

Difference

$A - B = \{x \mid x \in A \; and \; x \notin B \}$

Example: $A = \{1, 4, 5, 6\}$ $B = \{1, 2, 4, 10\}$ $A - B = \{5, 6\}$

Mutual Difference

$A \oplus B = (A - B) \cup (B - A)$

Example: $A = \{1, 4, 5, 6\}$ $B = \{1, 2, 4, 10\}$ $A \oplus B = \{2, 5, 6, 10\}$