Gebze Technical University
Department of Computer Engineering
CSE 241/505
Object Oriented Programming
Fall 2021
Homework # 4
Due date Dec 2nd 2021

DayofYearSet is a C++ class to represent a set of **DayOfYear** objects (in Turkish DayOfYear kümesi). This class has the following functions and features as well as any other functions that you think are necessary (setters, getters, etc.)

- **DayofYear** is an inner class with all its public and private members.
- **DayofYearSet** class keeps its elements using a **DayofYear** * data member.
- Has at least one constructor that takes a **vector** of **DayOfYear** objects.
- Overloaded stream insertion operator **operator<<** will print **DayofYearSet** details.
- Overloaded **operator==** and **operator!=** operators for comparing **DayofYearSet** objects. Two sets are equal if their elements are equal regardless of the keeping order.
- Member function **add** adds an element to the set. Please note that no duplicates are allowed in a set.
- Member function **remove** removes an element from the set.
- Member function **size** returns the number of elements.
- Overloaded binary **operator+** returns the union set.
- Overloaded binary **operator-** returns the difference set.
- Overloaded binary **operator^** returns the intersection set.
- Overloaded unary **operator!** returns the complement set. Note that there are only 365 days in a year.
- Overloaded binary **operator[]** returns the element at given position.
- Uses keywords **decltype** and **auto** in its implementation.
- The class will have a static function that returns the total number of **DayOfYear** objects alive in all the sets. Be careful here because there could be more than one set alive at the same time.

Your class uses a namespace and separates the class interface from the implementation.

Your driver code will be in a separate file. It will do the following
- Test each function at least 2 times and printing the results. Do not forget to test the constructors.
- Send the class objects to functions using call by value and call by reference and testing the results.
- Test the De Morgan rule for sets with at least 5 different set pairs. Note that for sets **s1** and **s2**, De Morgan says that **!(s1 + s2) == !s1 ^ !s2**
- Writes some sets to text files. Do not forget to include your saved files.

Notes:
- Do not use any functions from the standard C library (like **printf**)
- Do not use anything that we did not learn in the lectures.
- Check the validity of the user input.
- You should submit your work to the Teams page.
- Hint: Linux utility **valgrind** can test for memory leaks and other heap errors.