LAB 4: Classes
Thursday October 9th /Tuesday October 21st
SITE - University of Ottawa Fall 2025
Due ONLINE Wednesday, October 29 at midnight
In groups of up two students
/10

This Lab assignment deals with:
- Classes and objects, data encapsulation and member functions
- Constructors and Copy constructor

I. Lab Assignment 4
/10

Exercise 1: (4 MARKS: 1.5 pts for a) and 2.5 pts for b))

Define the following classes in the attached files (myFile1a.h and myFile1b.h respectively):

a) *Course* class containing the number (code) of a course, the number of course hours. So, define its methods:
   - *Course(): constructor*
   - *getNum(): read* code accessor
   - *getHours(): read* accessor to the number of hours

b) *Student* class containing the student's registration number ID, the maximum number of courses a student can take, the number of courses taken by the student as well as the list of these courses (pointer on an array of pointers to *Course* objects), the list of grades obtained for each of these courses (pointer on an array of integers). So, define its methods:
   - *Student() :* constructor
   - *~ Student () :* destructor
   - *average*() : function that returns the student's average grade,
   - *totalHours() :* function that returns the total number of course hours the student took.
   - *addCourse() :* adds a course to List_course

A main program is provided attached for you to test your methods (myFile1.cpp).

```
/****Output****/
```
The total hours of Yan is 180
The average of Yan is 13.5
The total hours of Jane is 180
The average of Jane is 13.5
Enter a number to exit...

Exercise 2: (6 MARKS : 0.75 pts for each method)

The *SetInt* class (myFile2.h) represents a set of integers. This class contains a constructor without parameters which creates an empty set and a constructor which receives as parameters an array of integers as well as its size and which creates a set of integers containing the elements of this array. A test program is given in myFile2.cpp.
The class also contains a destructor and the copy constructor, as well as methods that have the following function:
- *add()* allows you to add an integer to the set (if it does not already belong to it);
- *remove()* allows you to delete an integer from the set;
- *contains()* allows to test the membership of an integer to the set;
- *nbElem()* which provides the number of elements of the set;
- *tabElem()* which returns an array of dynamically allocated integers containing exactly the elements of the set (if the set is empty this function must return NULL).
- *containsAux()* allows you to test whether an integer (first argument) belongs to the set in a given position (second argument).

We impose here the use of an array of integers as data member of the class to contain the elements of the set. At any time, the size of the array will be equal to the number of elements in the set, when the set is empty, no array must be allocated.

Question:
Define the methods of the `SetInt` class, including constructors and destructors.

Note:
You are NOT ALLOWED to modify class declarations or the provided main programs.

```
/****Example of output****/
add an int element
10
add an int element
45
add an int element
21
add an int element
0
add an int element
568
a contains 10 :1
remove 10
a contains 10 :0
a contains :4 elements
The elements of a are :
45
21
0
568
```

Submit your work ONLINE (one zip file only) before Wednesday, October 29 at midnight

Instructions

- Create a directory that you will name Assignment4_GroupNum, where you will replace Num with your group number.
Put all the following files in your compressed directory Assignment4_GroupNum.zip for submission in the Brightspace Virtual Campus.

Files :

- ✓ *README.txt*
- ✓ *myFile1.cpp*
- ✓ *myFile1a.h*
- ✓ *myFile1b.h*
- ✓ *myFile2.cpp*
- ✓ *myFile2.h*

- Don't forget to add comments in each program to explain the purpose of the program, the functionality of each method and the type of its parameters as well as the result.
- In the Assignment4_GroupNum directory, create a text file named README.txt, which should contain **the names of the two students**, as well as a brief description of the content:

Student Name:
Student Number:
Course Code: CSI2372A

Academic Fraud:

This section of the assignment aims to raise students' awareness of the problem of academic fraud (plagiarism). Consult the following links and read both documents carefully:
https://www.uottawa.ca/current-students/academic-regulations-explained/academic-integrity
University regulations will apply to all cases of plagiarism. By submitting this assignment:
1. You confirm that you have read the above documents;
2. You understand the consequences of academic fraud.