

CSI 2372 – Assignment 1

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Constructors, Destructors,

Dynamic memory, and

Operator Overloading in C++



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Your task in this assignment is to apply the concepts you learned about constructors, destructors, dynamic memory, and operator overloading in C++. Make sure you have C++ installed, and you are familiar with the header files, and coding files.

Then, you should do the following programming task. Each programming task in this assignment is a design based on the subjects you learned during lectures.

Design a class for the concept of an integer number in a particular base. The number could contain any number of digits in a particular base. For example, $(512)_7$. Consider that base is always less than or equal to 36 and for presenting digits, you can use.

0, 1, 2, 3, 4, 5, 6, 7, 8, 9, A, B, C, D, ..., Z.

A means the digit 10, B means the digit 11, etc for all bases greater than 10.

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.

You are not allowed to use vector or string of STL. You should use dynamic memory and pointers.

Class BigInteger	
Method	Description
BigInteger	The default constructor that initializes the number to 0 and the base to 10
BigInteger	Takes a number(int) and a base and initialize the number and base in the class
BigInteger	The copy constructor
~BigInteger	The destructor
num_digits	The number of digits in the number in the given base
add_digit	Add a digit to the end of the number (The least significant digit)
remove_digit	Remove a digit from the end of the number (The least significant digit)
insert_digit	Insert a digit at a particular position

	Ignore the task if the position does not exist. For example, removing digit 1 from $(512)_7$ results in $(52)_7$
operator []	For indexing the digits
operator ==	Checks if two numbers are equal
operator >	Checks if the first number is greater than the second number
operator <	Checks if the first number is less than the second number
operator >=	Checks if the first number is greater than or equal to the second number
operator <=	Checks if the first number is less than or equal to the second number
operator !=	Checks if the first number is not equal to the second number
operator =	For assigning the second number to the first number
operator +	For adding two numbers, the result should be in the base of the first number
operator -	For subtracting the second number from the first number, the result should be in the base of the first number
operator *	For multiplying two numbers, the result should be in the base of the first number
operator ++	For increasing the number by 1. In both prefix and postfix format.
operator --	For decreasing the number by 1. In both prefix and postfix format.
operator /	For diving the first number by the second number, the result should be in the base of the first number (Integer division)
operator %	For getting the remainder of the division of the first number by the second number, the result should be in the base of the first number
operator <<	For printing a number
operator >>	For reading a number (You are allowed to use string here) First, read the number and then the base. If base is not matched, report an error and consider the least possible base.

You can add any method you need.

Hint: Upload the arithmetic operators with a regular integer first to make uploading other operators easy. For example,

```
BigInteger BigInteger::operator +(int)
```

Operators marked in red have bonus mark.

Rules

This is an individual assignment. No team work, you have to do it yourself. You are allowed to collaborate in thinking and brainstorming about problems with your classmates but you have to

write the programs yourself. Any similarity between your programs is considered plagiarism. Do not use any code or program from the Internet because it is also considered plagiarism. See the university policies for plagiarism in the following link.

<https://www2.uottawa.ca/about-us/provost>

Measures that we take to detect plagiarism

Teaching assistants have been instructed to report to the professor any suspicion of plagiarism they find when they mark assignments.

If plagiarism has been detected in any part or in the whole assignment, the professor will take appropriate measures. Recall that it is equally bad to copy a solution and to let someone else copy your solution.