

## MCS 360 Project Two : adding big natural numbers due Monday 4 October at noon

The goal of this project is to add big natural numbers using the STL vector class in the implementation of a class `Big_Nat`. The test program has a content as shown below.

```
#include "big_nat.h"
#include <iostream>

using namespace std;

int main()
{
    string s;

    cout << "Give x : "; getline(cin,s,'\n');
    Big_Nat x(s);
    cout << "---> x : " << x.to_string() << endl;
    cout << "Give y : "; getline(cin,s,'\n');
    Big_Nat y(s);
    cout << "---> y : " << y.to_string() << endl;
    Big_Nat z = x + y;
    cout << " x + y : " << z.to_string() << endl;

    return 0;
}
```

A natural number  $x$  of arbitrary length is stored as

$$x = x_0 + x_1B + x_2B^2 + \cdots + x_nB^n,$$

where each  $x_k$  is an unsigned 32-bit integer,  $0 \leq x_k < B$ . For easy conversion to a decimal string representation, use  $10^8$  for  $B$ . Declare  $B$  and 8 as constants in the class, so an adjustment to 64-bit integers is straightforward.

The class `Big_Nat` exports three methods:

1. conversion of a string into a coefficient vector (in the constructor),
2. the operator `+` to add two natural numbers, and
3. a method `to_string()` for a string representation.

Some important points:

1. You may develop your solution with any C++ compiler, but your solution will be tested with the `g++` compiler. It is recommended that before submission, you check your program on a computer in lab SEL 2263 on campus.
2. Your solution *must* use the STL vector class. Correct programs that do not use the STL vector class will receive only half of the points.
3. Every method in your program must have appropriate documentation. In particular, the documentation describes the purpose of every parameter.
4. Submit two files: the header file `big_nat.h` and the file `big_nat.cpp`.
5. Handing in an incomplete but working program is better than handing in a program that crashes or does not run at all.
6. The first line of your C++ program must be

```
// MCS 360 Project Two by <Author>
```

where you replace the `<Author>` by your name.

7. Collaborations are not allowed. You must solve the project on your own.
8. Email your solution to the project to `jan@math.uic.edu` before noon on Monday 4 October so the date of the email is proof of an on time submission. As a backup, bring also a printed version of your solution to class.

If you have questions or difficulties with the project, feel free to come to my office for help.