OOP HW1 spec

PROBLEM 1:

BIG INTEGER

In this problem, you need to implement large integer arithmetic: addition, subtraction, multiplication, and division. You need to declare a class called “Large” and overload the following operator:

<<	**Put to operator (cout) (10%)**
>>	**From operator (cin) (10%)**
+	**Addition operator (10%)**
-	**Subtraction operator (10%)**
*****	**Multiplication operator (20%)**
/	**Division operator (20%)**
<	**Less than operator (5%)**
>	**Greater than operator (5%)**
==	**Equal operator (5%)**
-	**Negative operator (5%)**

In division, set the precision to the third digit after the decimal point.
You should name your file “XXXXXXX_1.hpp” and “XXXXXXX_1.cpp”. (studentID_1.cpp)
Hint: You can use string in your constructor

Input

Your program should accept two large number through cin, so you need to overload “>>” operator.
Test data will be in [-999999999999999999999999, 999999999999999999999999].

Output

You program should output those answer through cout, so you need to overload “<<” operator. And your program should support below operation with large number.

Sample Input

```
222222222222222222222222
111111111111111111111111
```

Sample Output

```
a = 222222222222222222222222
-a = -222222222222222222222222
b = 111111111111111111111111
-b = -111111111111111111111111
a > b ? True
a < b ? False
a = b ? False
a + b = 333333333333333333333333
a - b = 111111111111111111111111
a * b = 246913580246913580246913530864197530864197530864 2
a / b = 2
```

Following code is an easy sample to test your assignment:

```cpp
#include <iostream>
#include "08XXXXX_1.hpp"
using namespace std;

int main()
{
    Large a, b;
    cout << "Please ENTER two number a and b: ";
    cin >> a >> b;
    cout << endl;
    cout << "a = " << a << endl;
    cout << "-a = " << -a << endl;
    cout << "b = " << b << endl;
    cout << "-b = " << -b << endl << endl;
    cout << "a > b ? " << (a > b) << endl;
    cout << "a < b ? " << (a < b) << endl;
    cout << "a = b ? " << (a == b) << endl << endl;
    cout << "a + b = " << a + b << endl;
    cout << "a - b = " << a - b << endl;
    cout << "a * b = " << a * b << endl;
    cout << "a / b = " << a / b << endl;
    return 0;
}
```

PROBLEM 2:

POLYNOMIAL

This problem asks you to create a class called **Polynomial** that includes the following functions:

- Calculate the value of polynomial.
  $c_0 x_n + c_{\substack{n-1 \\ 1}} + ... + c_{n-1} x + c_n$
- Calculate its first derivative.
  $c_0 n x_{n-1} + c_1 (n-1) x_{n-2} + ... + c_{n-1}$
- Calculate its second derivative.
  $c_0 n(n-1) x_{n-2} + c_1 (n-1)(n-2) x_{n-3} + ... + c_{n-2}$

The class should have:

- A private member variable called **x** that holds the value of x.

```
int x;
```

- A private member variable called **coef** which is a vector type int holds the coefficients of the polynomial.

```
vector<int> coef;
```

- A constructor that takes an int as input. Set **x** to the input integer and store the coefficients to the **coef**.
- A function named **calculate**. The function should calculate the value of the polynomial.
- A function named **firstDerivative**. The function should calculate the first order derivative of the polynomial.
- A function named **secDerivative**. The function should calculate the second order derivative of the polynomial.

The absolute value of all the input and output will be less than 2_{31}.

You should name your file "XXXXXXX_2.cpp". (studentID_2.cpp)

Input

Your program should accept an even number of lines of text. Each pair of lines will represent one problem. The first line will contain one integer: the value for x. The second line will contain a string, which represents a set of polynomial coefficients $(c_0, c_1, c_2, ..., c_n)$. Each coefficient will be seperated by one or more blanks.
Input is terminated by EOF.

Output

For each pair of lines, your program should calculate the value of polynomial, the first order derivative of polynomial, and second order derivative of polynomial for the given value x and output it in a single line.

Sample input

```
2
1 1 1
1
1  1  1
```

Sample output

```
7 5 2
3 3 2
```

Deadline

2020/05/06 00:05

Submit

Pack your files into a compressed file named by "studentID.zip" (ex. 08XXXXX.zip) and upload to the e3 platform.

Grading

Plagiarism: -100%
Late: -100%
執行結果以交大資工系計中 linux 工作站為主