3 Exercises

1. Continue improving the Complex class and adding more operations for it, such as: **-, *, ~, ==, !=** etc. Make the following program run correctly.

```
#include <iostream>
#include "complex.h"
using namespace std;

int main()
{
    Complex a(3, 4);
    Complex b(2,6);

    cout << "a = " << a << endl;
    cout << "b = " << b << endl;
    cout << "~b = " << ~b << endl;
    cout << "a + b = " << a+b << endl;
    cout << "a - b = " << a-b << endl;
    cout << "a - 2 = " << a-2 << endl;
    cout << "a * b = " << a*b << endl;
    cout << "2 * a = " << 2*a << endl;

    Complex c = b;
    cout << "b == c? " << boolalpha << (b==c) << endl;
    cout << "b != c? " << (b!=c) << endl;
    cout << "a == b? " << (a==b) << endl;

    Complex d;
    cout << "Enter a complex number(real part and imaginary part):";
    cin >> d;
    cout << d << endl;
    return 0;
}
```

Note that you have to overload the **<< and >> operators**. Use const whenever warranted.

A sample runs might look like this:

```
a = 3+4i
b = 2+6i
~b = 2-6i
a + b = 5+10i
a - b = 1-2i
a - 2 = 1+4i
a * b = -18+26i
2 * a = 6+8i
b == c? true
b != c? false
a == b? false
Enter a complex number(real part and imaginary part):3 -6
3-6i
```

2. Could the program be compiled successfully? Why? Modify the program until it passes the compilation. Then run the program. What will happen? Explain the result to the SA.

```
#include <iostream>
#include <memory>

using namespace std;

int main()
{
    double *p_reg = new double(5);
    shared_ptr<double> pd;
    pd = p_reg;
    cout << "*pd = " << *pd << endl;

    shared_ptr<double> pshared = p_reg;
    cout << "*pshred = " << *pshared << endl;

    string str("Hello World!");
    shared_ptr<string> pstr(&str);
    cout << "*pstr = " << *pstr << endl;

    return 0;
}
```