Assignment 1

Deadline:	Hand in by 5pm on Monday 8th September 2014 (after mid-semester break)
Evaluation:	10 marks – which is 10% of your final grade
***Late Submission**:*	1 Mark off per day late
Work	This assignment is to be done **individually** – your submission may be checked for plagarism against other assignments and against Internet repositories. If you adapt material from the Internet acknowledge your source.
Purpose:	To get you thinking about Classes, Object-Orientation and C++ language features.

Problem to solve:

Write and comment/document your own Complex numbers class in C++ that works with **float** and **double** representations.

Requirements:

Your class - in *mycomplex.h* - should support the following program (with suitable includes):

```
#include <iostream>
#include “mycomplex”
using namespace std;
int main(){
        complex<double> a(1.0, 2.0);
        complex<float> b;

        cout << "Enter b: ";
        cin >> b;

        cout << "a = " << a << "\n";
        cout << "b = " << b << "\n";

        cout << "a + b = " << a + b << "\n";
        cout << "a * b = " << a * b << "\n";
        cout << "a / b = " << a / b << "\n";
        cout << "|a| = " << abs(a) << "\n";
        cout << "complex conjugate of a = " << conj(a) << "\n";
        cout << "norm of a = " << norm(a) << "\n";
        cout << "abs of a = " << abs(a) << "\n";
        cout << "exp(a) = " << exp(a) << "\n";
}
```

Hand-in: Submit your **program and documentation** (a zip file is acceptable) by email to d.p.playne@massey.ac.nz Marks will be allocated for: correctness, fitness of purpose, utility, style, use of sensible **comments and program documentation**, and general elegance! Good comments will help me to award you marks even if your code is not quite perfect.

Additional Notes on the Technical Specification and Hints:
Some calculations need to be done to a particular precision, so this is an opportunity to look at how to use the Templates mechanism to parameterise a non-trivial code application to cope with 32 bit float or 64 bit double complex numbers. Many of the online complex class implementations you will find on the Web are in fact wrong – they use a numerically unsafe algorithm for some of the arithmetic. I will therefore know if you have implemented your own code or have copied an online one.

See the following for some ideas on complex numbers **http://complexity.massey.ac.nz/cstn/048/cstn-048.html**

For your parameterized complex class, think how to cope with mixed arithmetic operations that involve float and double. How will you handle casts, coercions, automatic promotions etc?

If you have any questions about this assignment, please ask the lecturer.