

Please fill in your Student Number and, optionally, Name.

Student Number : _____

Name : _____

University of Cape Town ~ Department of Computer Science

Computer Science 1015F ~ 2007

Supplementary Theory Test 3A

Question	Mark	Max	Initials
1		10	
2		10	
3			
TOTAL		30	

Marks : 30

Time : 40 minutes

Instructions:

- a) Answer all questions.
- b) Write your answers in the space provided.
- c) Show all calculations where applicable.

Question 1: OOP Concepts. [10]

a) What is overloading? [2]

b) Briefly discuss one advantage of overloading. [1]

c) What is encapsulation? Why is it important? [2]

d) Explain the purpose of each of the 3 modifiers typically used for constant declarations. [3]

e) Why can a static method not call a non-static method? [2]

Question 2: Class Definitions [10]

Consider the following class definition and answer the questions that follow.

```
class Complex
{
    private double real;
    private double imaginary;

    public Complex ( double r, double i )
    {
        real = r;
        imaginary = i;
    }
    public Complex ( double r )
    {
        real = r;
        imaginary = 0;
    }

    public double getReal ()
    {
        return real;
    }

    public String toString ()
    {
        if (Math.abs (imaginary) > 0)
        {
            if (imaginary < 0)

                return "" + real + imaginary + "i";
            else
                return real + "+" + imaginary + "i";
        }
        else
            return "" + real;
```

```
}  
}
```

a) Write a statement to create a variable of this type and assign to it an object corresponding to the real number 42, using the most efficient overloaded constructor. [2]

b) Write a mutator for the instance variable named **imaginary**. [3]

c) Explain exactly what the output of this **toString** method is. [2]

d) Write a method to add another **Complex** object to the current one. Assume the existence of appropriate accessors. [3]
