

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

Student Number : _____

Name : _____

University of Cape Town ~ Department of Computer Science

Computer Science 1015F ~ 2007

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 a constructor? [2]

b) Are constructors absolutely necessary? Discuss briefly. [2]

c) Why is information hiding important? [2]

d) How does Java support information hiding? [2]

e) Discuss one advantage of using a wrapper class. [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 complex number $1 + 2i$. [2]

b) Write an accessor for the instance variable named **imaginary**. [3]

c) Why do we not need to instantiate the **Math** class before using the **abs** method? [1]

d) Write a method to square the current object, overwriting its previous values. (Hint: Remember that i is the square root of -1) [4]
