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 Solution

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]

a special method to initialise objects [2]

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

no. initialisation is not necessary, and can be done using other methods or not at all. [2]

c) Why is information hiding important? [2]

prevents programmers from accessing those parts of objects they should not be accessing = fewer errors. [2]

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

using public and private modifiers to control access [2]

e) Discuss one advantage of using a wrapper class. [2]

it converts a primitive type to an object, which has many advanced facilities and methods. [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]

Complex c [1] = new Complex (1, 2); [1]

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

double [1] getImaginary () [1]

{

return imaginary; [1]

}

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

it is a static 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]

public void square () [1]

{

*double newreal = real*real – imaginary*imaginary; [1]*

*double newimaginary = 2*real*imaginary; [1]*

real = newreal; [1/2]

imaginary = newimaginary; [1/2]

}