

**Please fill in your Student Number and Name.**

Student Number : \_\_\_\_\_

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Student Number:  
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**University of Cape Town ~ Department of Computer Science**

**Computer Science 1016S ~ 2009**

**Supplementary Test 1**

Question	Max	Mark	Internal	External
1	10			
2	17			
3	3			
<b>TOTAL</b>	<b>30</b>			

**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 [10 marks]

Examine the Java application listed below.

```
public class CalculateDemo
{
    public static void main(String[] args)
    {
        System.out.println(Calculate(8));
    }

    public static int Calculate(int n)
    {
        return (Calculate(n-1)*n);
    }
}
```

This recursive program should print out  $n!$  for a given integer  $n$ . However, when executed, this program produces the following error:

Exception in thread "main" java.lang.StackOverflowError

- a) Explain what a **StackOverflowError** is and why this type of error can occur in recursive functions. [3]

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## Question 2 [17 marks]

Examine the Java application listed below.

```
import java.*;
public class Mystery
{
    public static void main (String [] args)
        throws FileNotFoundException
    {
        Scanner a = new Scanner (new FileInputStream
            ("myfile1.txt"));
        PrintWriter b = new PrintWriter(new
            FileOutputStream("myfile2.txt"));

        a.useDelimiter("i"); // For input, the String
        // delimiter changed from a blank char to an 'i'

        while (a.hasNext())
            b.print(a.next() + "#");

        a.close();
        b.close();
    }
}
```

a) Before the program is run, the file “myfile1.txt” contains the lines:

Bite it swiftly

And the file “myfile2.txt” contains the lines:

```
43.2  2.55  71.8  4.3
48.7  7.23
51.2
```

Write down the **exact** contents of each of these files after the program is run. [6]

myfile1.txt: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

myfile2.txt: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

b) Explain why it is a good idea to include the following lines in the program above:  
a.close();  
b.close();

[3]

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c) Rewrite the program above so that it counts the sum of the numbers in the file  
“myfile2.txt” and prints this sum to the screen.

[5]

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### Question 3 [3 marks]

Examine the program below.

```
public class OutputMysteryDemo
{
    public static void main(String[] args)
    {
        try {
            testMethod(7);
        }
        catch(Exception e) {
            System.out.println("Exception Caught in Main");
        }
        finally {
            System.out.println("End of Main");
        }
    }

    public static void testMethod(int n)
        throws Exception
    {
        try {
            if (n > 0)
                throw new Exception( );
            else if (n < 0)
                throw new NegativeNumberException( );
            else
                System.out.println("No Exception.");

            System.out.println("Still in sampleMethod.");
        }

        catch(NegativeNumberException e) {
            System.out.println("Caught in sampleMethod.");
        }

        finally {
            System.out.println("In Test finally block");
        }

        System.out.println("After Test finally block");
    }
}
```

a) Write down the exact output of this program.

[3]

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