University of Cape Town
Department of Computer Science

Computer Science CSC115F

Final Examination

- Answer all questions.

- All questions that refer to elements of programming make reference to the Java programming language as studied in class.

- Good luck !

Marks: 25

Time: some minutes

- Approximate marks per question are shown in brackets

- The use of calculators is permitted

	Surname		Initials
NAME:			

STUDENT NO: | | **COURSE CODE:** CSC

This paper consists of 2 questions and 5 pages (including this cover page).

Mark Allocation							
Quest	Marks	Internal	External	Quest	Marks	Internal	External
1	[10]			2	[14]		
Total				**Total**			
				Grand Total			
				Final Mark			
Internal Examiner:				**External Examiner:**			

Section 1. Basic Java Concepts

Question 1.   **[10 marks]**

Study the following program and answer the questions that follow.

```java
public class sandwich
{
   public static void main ( String [] args )
      throws java.io.IOException
   {
      int wich;

      do {
         wich = Keyboard.readInt("sandwich number? ");

         switch (wich)
         {
            case 1 : System.out.println ("add onions");
            case 2 : System.out.println ("add garlic");
            case 3 : System.out.println ("add tomato");
            break;
            default: System.out.println ("read the menu again!");
         }
      } while (wich != 0);

   }
}
```

  a) What is a **class**?   [2]

  _____

  _____

  b) Is *wich* an instance variable or a local variable? Briefly explain why you believe
     this is so.   [2]

  _____

  _____

  _____

  c) What is the output of the program if the input is "2"?   [1]

  _____

  _____

  _____

  _____

d) The switch statement executes at least once, even if the user enters "0". How can the program be modified to prevent this?   [2]

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e) Assuming you want to use path testing, provide a sequence of test values to be used as input.   [3]

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Section 2. Problem Solving

Question 2.   **[14 marks]**

a) Write a method **calcRoots** to calculate and output both roots of the quadratic polynomial $ax^2 + b^x + c$. The formula for this is $\frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$. Output an error if the roots cannot be found (i.e., they are complex numbers).   [7]

```
public class roots
{
   public static void main ( String [] args )
      throws java.io.IOException
   {
      float a = Keyboard.readInt("Enter a: ");
      float b = Keyboard.readInt("Enter b: ");
      float c = Keyboard.readInt("Enter c: ");

      // write your code here

   }
}
```

b) Write a method **calcPayments** to calculate the number of payments needed to repay a bank loan, if at the end of each month a payment of *payment* rands is made before interest is calculated and added at a monthly rate of *interest* (percent). Assume the initial amount of the loan is *loan*. Assume all values are floating point values and ignore issues related to rounding. [7]

```
public class loan
{
   public static void main ( String [] args )
   {
      loanCalc l = new loanCalc ();

      // test the class
      System.out.println ("Months = " +
         l.calcLoan (150000, 1, 2000));
   }
}

class loanCalc
{
   public int calcLoan ( float loan, float interest, float payment )
   {
      // write your code here









   }
}
```