

Please fill in your Student Number and Name.

Student Number : _____

Name: _____

Student Number: _____

University of Cape Town ~ Department of Computer Science

Computer Science 1015F ~ 2008

June Exam

Question	Max	Internal	External	Question	Max	Internal	External	
1	9			7	3			
2	8			8	8			
3	8			9	9			
4	15			10	8			
5	10			11	8			
6	14							
					TOTAL	100		

Marks : 100

Time : 180 minutes

Instructions:

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

Question 1 [9]

a) State Moore's Law. [1]

b) Does Moore's Law still hold? Explain your answer. [1]

c) What is the purpose of a central processing unit? [1]

d) What is computer hardware? [1]

e) What is a computer program? [1]

f) What is the difference between a high-level and low-level programming language? [2]

g) Briefly describe 2 disadvantages of using Java bytecode, as opposed to machine code. [2]

Question 2 [8]

Consider the following program and answer the questions that follow.

```
import java.util.Scanner;

class Test
{
    public static void main ( String [] args )
    {
        Scanner input = new Scanner (System.in);

        int a = input.nextInt();
        int b = input.nextInt();
        int c = input.nextInt();

        int x = Math.min (Math.min (a, b), c);
        int y = Math.max (Math.max (a, b), c);

        System.out.println (a+b+c-x-y);
    }
}
```

a) What does this program do? [2]

b) What is the output if the input is the numbers 5, 3 and 7? [1]

c) List all variables from within the main method. [1]

d) Why must the main method be public? [1]

e) Rewrite the last statement of the main method so there is a logic error. [1]

f) What are 2 techniques that can be used to find the logic error? [2]

Question 3 [8]

- a) Briefly describe an algorithm to put on your shoes. Assume you already have chosen/found the shoes. There should be at most 6 steps. [3]

- b) Write the Java statement to input the number of pairs of shoes into the variable **N**. You may assume **N** is already declared as an int and there is already a Scanner object named **input**. [2]

- c) Write the Java statement to calculate the variable **totalWorth** as the price of **N** pairs of shoes at a cost of **pricePerPair** for each pair. You may assume **totalWorth** and **pricePerPair** are already declared as float variables and **N** is declared as an int. [1]

- d) Write the Java statement to output “Worth of shoes: ”, immediately followed by the value of the variable **totalWorth**. [2]

Question 5 [10]

Study the following code and answer the questions that follow.

```
public class ClassA
{
    method()
    {
        /*
           Variable declarations and other code is here
        */
        if (problem) // no point in continuing so we
                    //terminate the method
            return; //terminate the method
        /*
           More code in here
        */
        return usefulDataValue; // return some data value of
                                //a particular data type
    } //end of method
} //end of class declaration
```

a) Identify the program errors in the code fragment. All of the variables needed have been declared and initialized. (Choose two). [2]

- i. The return data type for the method is not specified.
- ii. The formal parameter list is not specified (should be declared as void).
- iii. An access modifier is not specified.
- iv. The method is attempting to return both a data type and a void type concurrently.
- v. There should never be more than one return statement in any method

b) Write the syntax of a method that returns a value. [2]

c) Write the syntax of a **void** method. [1]

d) What are Java classes? [2]

e) Write minimal Java code to create a class and an object of the class. [3]

Question 7 [3]

When used with objects, what is the equality (==) operator really comparing? [3]

```
/**
Precondition:  i and j are legal indices for the array a.
Postcondition: Values of a[i] and a[j] have been
interchanged                                     [3]
*/
private void swap ( int i, int j, int[] a )
{


---




---




---




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---




---


}

```

b) Below are 5 Java terms and 3 explanations of Java concepts. Which of the Java terms fits each explanation? The 5 terms (possible answers) are: `getClass`, `instanceof`, `protected`, `super`, `this` [3]

i. Which term is used inside a derived class (subclass) to call the base class (superclass) constructor?

ii. Which term can be used instead of `public` or `private` to restrict access to subclasses and classes in the same package?

iii. Which is a method that returns a representation of the class of an object?

c) Given that `ChildrensBook` is a subclass of `Book`, state whether or not there is an error in lines 3 and 4 below. Give a brief reason for each answer to show your understanding of inheritance in Java. [2]

```
Book myBook = new Book( "Exodus", "123.456");  
ChildrensBook kidbook = new ChildrensBook("X","?" );  
myBook = kidbook; // line 3  
kidbook = myBook; // line 4
```

line 3: _____

line 4: _____
