

UNIVERSITY OF LONDON

291 0109 ZA

FOR EXTERNAL STUDENTS (West)

BSc/Diploma Examinations

**COMPUTING AND INFORMATION SYSTEMS AND
CREATIVE COMPUTING**

**2910109 Introduction to Java and Object-Oriented
Programming**

Duration: 3 hours

Date and time: Thursday 15 May 2008 : 10.00 – 1.00 pm

There are six questions in this paper. You should answer no more than FOUR questions. Full marks will be awarded for complete answers to a total of FOUR questions. Each question carries 25 marks. The marks for each part of a question are indicated at the end of the part in [.] brackets.

There are 100 marks available on this paper.

No calculators should be used.

**THIS EXAMINATION PAPER MUST NOT BE REMOVED
FROM THE EXAMINATION ROOM**

QUESTION 1

- (a) (i) The following Java program has a syntax error. What is it?

```
class A
{
    public static void main(String [ ] args)
    {
        System.out.println("Hello World");
    }
}
```

- (ii) The following Java program has a compilation error. What is it?

```
class B
{
    public static void main(String[ ] args)
    {
        s = 55;
        System.out.println(s);
    }
}
```

- (iii) The following program has a compilation error. What is it?

```
class f
{
    public static void main(String [ ] args)
    {
        boolean x=5;
    }
}
```

[9 Marks]

- (b) (i) Using a loop, write a program that prints hello 1000000 times.
(ii) Write a program to print out the number of bits in a gigabyte. (A gigabyte is 2^{10} megabytes, a megabyte is 2^{20} bytes and a byte is 8 bits). Your program must do the calculation.

[8 Marks]

- (c) Write a program which emulates rolling a die. Every time the program is run, it outputs a random number between 1 and 6.

[8 Marks]

QUESTION 2

- (a) (i) The following Java program has a syntax error. What is it?

```
class bad
{
    public static void main(String[] args)
    {
        System.out.println("Henry")
    }
}
```

- (ii) Explain the difference between `System.out.print` and `System.out.println`
(iii) What is the output of the following Java program?

```
class P
{
    public static void main(String[] args)
    {
        System.out.println(3/2);
    }
}
```

[9 Marks]

- (b) (i) Write a Java program which prints out the number of seconds in a year. Your program should do the calculation.
(ii) What is the output of the following program?

```
class Hello5
{
    public static void main(String[] args)
    {
        int s;
        s = 15*2;
        System.out.println("s");
    }
}
```

[8 Marks]

- (c) Write a program in which the user enters a year and the program says whether it is a leap year or not. A leap year is any number which is divisible by 4 which is not divisible by 100 unless it is also divisible by 400.

[8 Marks]

QUESTION 3

- (a) (i) When we run this program there is an error. Explain it.

```
class p
{
    public static void main(String[] args)
    {
        int[ ] num = new int[2];
        num[79]=3;
    }
}
```

- (ii) How do we refer to the initial (first) element of the array num above? Is it

- i. num[0] ?
- ii. num[1] ?
- iii. num[2] ?
- iv. num[3] ?
- v. num[79]?

- (iii) How do we refer to the last element of the array num above? Is it

- i. num[0] ?
- ii. num[1] ?
- iii. num[2] ?
- iv. num[3] ?
- v. num[79]?

[9 Marks]

- (b) What is the output of the following program?

```
class R
{
    public static void main(String[] args)
    {
        int[] a=new int[10];
        for(int i=0;i<10;i++) a[i]=i;
        for(int i=0;i<10;i++) System.out.println(a[i]);
    }
}
```

(question continues on next page)

[8 Marks]

(c) The following program prints out today's date as three integers.

```
import java.util.Calendar;
class age
{
    public static void main( String [] args)
    {
        Calendar rightNow = Calendar.getInstance();
        int year =rightNow.get(rightNow.YEAR);
        int month =rightNow.get(rightNow.MONTH);
        int day =rightNow.get(rightNow.DAY_OF_MONTH);
        System.out.println(year);
        System.out.println(month);
        System.out.println(day);
    }
}
```

Write a complete Java program that asks the user to enter their date of birth as three integers. The program should then output the user's age in years. (Remember that the months are numbered from 0 to 11.)

[8 Marks]

QUESTION 4

(a) What is the output of each of the three programs below?

```
(i) class A
{
    public static void main(String[] args)
    {
        int x=3;
        int y=4;
        if (x>y)
            System.out.println(x);
        else
            System.out.println(y);
    }
}
```

```
(ii) class B
{
    public static void main(String[] args)
    {
        int x=3;
        int y=4;
        if (x>y||x<y)
            System.out.println(x);
        else
            System.out.println(y);
    }
}
```

```
(iii) class C
{
    public static void main(String[] args)
    {
        int x=3;
        int y=4;
        if (x>y && y<x)
            System.out.println(x);
        else
            System.out.println(y);
    }
}
```

(question continues on next page)

[9 Marks]

- (b) What is the output of the following program?

```
class R
{
    public static void main(String[] args)
    {
        String x ="hello";
        for (int i=x.length()-1;i>0;i--) System.out.print(x.charAt(i));
    }
}
```

[8 Marks]

- (c) Write a complete Java program that checks whether the String entered by the user on the command line is in the file called words. This file contains one word per line. If it finds the word entered by the user, the program prints **yes!**. Otherwise it prints **no!**. Your program should be as efficient as you can make it.

[8 Marks]

QUESTION 5

- (a) (i) What is the output of the following program?

```
class r
{
    static int f(int n)
    {
        return n;
    }

    public static void main(String [ ] args)
    {
        System.out.println(f(3));
    }
}
```

- (ii) What is the output of the following program?

```
class r
{
    static int f(int n)
    {
        return g(n)+1;
    }

    static int g(int n)
    {
        return n+1;
    }

    public static void main(String [ ] args)
    {
        System.out.println(f(3));
    }
}
```

(question continues on next page)

(iii) What is the output of the following program?

```
class r
{
    static int f(int n)
    {
        return n+1;
    }

    static void g(int n)
    {
        System.out.println(f(n)+f(n-1));
    }

    public static void main(String [ ] args)
    {
        g(f(3));
    }
}
```

[9 Marks]

(b) (i) What is the output of the following program?

```
class r
{
    static int f(int n)
    {
        if (n==0) return 0;
        else return n * f(n-1);
    }

    static void g(int n)
    {
        System.out.println(f(n));
    }

    public static void main(String [ ] args)
    {
        g(3);
    }
}
```

Briefly explain your answer.

(question continues on next page)

[8 Marks]

- (c) The *Fibonacci numbers* are defined as follows: The first Fibonacci Number is 1. The second Fibonacci number is 1. All other Fibonacci numbers are the sum of the previous two Fibonacci Numbers. For example, the third Fibonacci number is $1+1=2$. and the fourth Fibonacci Number is $1+2=3$. So the sequence starts 1,1,2,3,5,8,13 ...

Write a complete Java program that prints out the first 1000 Fibonacci numbers in **reverse** order.

[8 Marks]

QUESTION 6

- (a) (i) What is the output of the following program?

```
public class A
{
    public static void f(String s)
    {
        try
        {
            Integer.parseInt(s);
            System.out.println("tomato");
        }
        catch(Exception e)
        {
            System.out.println("potato");
        }
    }

    public static void main(String[] args)
    {
        f("hello");
    }
}
```

- (ii) What is the output of the following program?

```
public class A
{ public static void main(String[] args)
{
    int a=7;
    int b=8;
    a=b;
    b=a;
    System.out.println(b);
}
}
```

(question continues on next page)

(iii) What is the output of the following program?

```
public class A
{
    public static void main(String[] args)
    {
        int a=10; int b=12; int c=b;
        b=a;a=c;      System.out.println(a+" "+b);
    }
}
```

[9 Marks]

(b) (i) Describe the behaviour of the following program.

```
import element.*;
import java.awt.*;
class m
{
    public static void main( String [] args)
    {
        DrawingWindow d = new DrawingWindow();
        Rect c= new Rect(10,10,20,30);
        d.setForeground(Color.red);
        d.fill(c);
        boolean inRect=false;
        while (true)
        {
            Pt mouse= d.getMouse();
            if (c.contains(mouse) && !inRect)
            {
                d.setForeground(Color.black);
                inRect=true;
                d.fill(c);
            }
            else if (!c.contains(mouse) && inRect)
            {
                d.setForeground(Color.red);
                inRect=false;
                d.fill(c);
            }
        }
    }
}
```

(question continues on next page)

[8 Marks]

- (c) (i) Define a class `Date` consisting of a Day, Month and Year. Write an instance method for the `Date` class which returns `true` if *this* date comes before the other `Date` which is supplied as a parameter to the method.
- (ii) Writing an expression which evaluates whether the 3rd February 1983 comes before a date `d`.

[8 Marks]