

Exam Example 2005

Date: October 12, 2005

1. Sum the binary numbers 1101 and 1011.
2. The following complete program is supposed to compute and print out the product of two numbers (5 and 8). It contains one (major) syntax error and one logic error. Correct both.

```
public class Product
{
    int x = 5, y = 8, p = 0;
    while (x > 0)
    {
        x--;
        p = p + y;
    }
    System.out.print(x + " times " + y + " equals " + );
}
```

3. What is the function of `javac.exe` and what is the function of `java.exe`.
4. Why is Java slower than C or C++ languages?
5. The following Java code has one bug. Find and correct it.

```
public class Blah
{
    private int x;
    public Blah(int x2)
    { x = x2;}
}

public class BlahBlah
{
    private int y;
    private Blah blah;

    public BlahBlah()
    {
        blah = new Blah(y);
        System.out.println(blah.x);
    }
}
```

6. (a) At least one class in a Java application normally contains a method with the following header:

```
public static void main(String[] args)
```

Explain the meaning of this, and the purpose of such a method.

- (b) Describe and explain the output of the following Java program:

```
public class Q6
{
    public static void main(String[] args)
    {
        Q6 a = new Q6();
        a = new Q6();
        a.increment();
        System.out.println(a.value());
        a.increment();
        System.out.println(a.value());
    }

    public Q6() { count1 = 1; count2++; }
    public void increment() { count1++; }
    public int value() { return count1 + count2; }
    private int count1;
    private static int count2 = 1;
}
```

7. Create a class `Rectangle` that represents a rectangular region of the plane. A rectangle should be described using four integers: two represent the coordinates of the upper left corner of the rectangle, giving its location; one for the width; and one for the height. Your rectangle should include:
- Appropriate constructors;
 - A method `toString()` that returns a string containing all the instance variables of the rectangle;
 - A method `translate()` that takes two integers, `deltaX` and `deltaY`, used to translate the location of the rectangle;
 - A method `contains()` that takes two integers, `xCoord` and `yCoord`, and returns true if the point given by these two values lies within the rectangle, and
 - A method `intersection()` that takes a `Rectangle` as a parameter and returns a new `Rectangle` that forms the intersection of the `Rectangle` upon which the method is operating and the `Rectangle` parameter.

8. What is the output of the program given below. What is the type of the result printed by the `println()` methods?

```
class p5
{
    public static void main(String[] args)
    {
        double x = 10;
        float y = 5;
        int z = 2;

        System.out.println(x*y/2*z-y*z/x);
        System.out.println((x*y)/2*z-y*z/x);
        System.out.println(x*(y/2)*z-y*z/x);
        System.out.println(x*y/(2*z)-y*z/x);
        System.out.println(x*y/2*(z-y)*z/x);
        System.out.println(x*y/2*z-(y*z)/x);
        System.out.println(x*y/2*z-y*(z/x));
    }
}
```

9. When the Java compiler processes the program below it generates a syntax error. Please find the error, and explain why it happened. Then fix the error.

```
public class p3
{
    static double sum(double n1, int n2)
    { return n1 + n2; }

    static double sum(int n1, double n2)
    { return n1 + n2; }

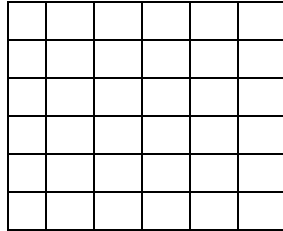
    public static void main(String[] args)
    { System.out.println(sum(5.0, 5.0)); }
}
```

10. Please provide the output of the program below.

```
public class p8
{
    public static void main(String[] args)
    {
        String str = "abcdefghijklmn";

        for (int i = 0, j = str.length(); (j - i) > 0; i++, j--)
        {
            System.out.println(str.substring(i,i+1));
            System.out.println(str.substring(j-1,j));
        }
    }
}
```

11. Write a Java applet that draws the grid shown below. Each rectangle is 35 pixels wide and 40 pixels high. The top left rectangle has top left coordinates (200, 100). Use 4 constants TOPX, TOPY, W, H in your program. Use nested for loops. The base framework for your applet is given:



```
import java.awt.*;
import java.applet.Applet;

public class Myclass extends Applet
{
    public void paint (Graphics g)
    {
        } // end paint
} // end class
```

12. Write the output of the following conditions:

```
int a = 6;
int b = 9;
```

```
if (a < b)
    System.out.println("A");
    if (b > 7)
        System.out.println("B");
else
    System.out.println("C");
```

```
if (a > b)
{
    System.out.println("A");
    if (b > 7)
        System.out.println("B");
}
else
    System.out.println("C");
```

13. What will be printed by the following program:

```
public class e2
{
    public static void main(String[] args)
    {
        int x = 5;
        while (x >= 0)
        {
            x--;
            if ( (x%2) == 0) continue;
            if (x < 0) break;
            System.out.print(x + " ");
        }
    }
}
```

14. What is wrong with the following excerpt of Java code? Assume Person is a valid class.

```
ArrayList<Object> aa = new ArrayList<Object>();
Person xx = new Person();
aa.add(xx);
Person xy = aa.get(0);
```

15. Given a valid class "Vampire," we can create a 3-dimensional array of Vampires as `Vampire[][][] vamp = new Vampire[3][2][4]`

In this sample array, what is the value of

```
vamp.length
vamp[1].length
vamp[2][1].length
```

16. What will be printed by the main method below:

```
public class Go
{
    Go() { z = y; }

    public static void main(String[] args)
    { System.out.println((new Go()).z); }

    int x;
    static int y;
    static int z;

    { x = 1;}

    static
    { y = 2;}
}
```

17. Consider two implementations of the class BankAccount:

```
public class BankAccount1
{
    .....
    public int getNumberAccounts()
    { return lastAssignedNumber; }

    private static int lastAssignedNumber = 0;
    private int accountNumber;
    private double balance = 0;
}
```

and

```
public class BankAccount2
{
    .....
    public static int getNumberAccounts()
    { return lastAssignedNumber; }

    private static int lastAssignedNumber = 0;
    private int accountNumber;
    private double balance = 0;
}
```

Find the only difference between the classes and explain whether the Java compiler will compile each of these two classes.

18. Assume that you have designed your own package `nl.unimaas.fdaw` with a class `Assignment.class`. The class path in the settings of your Windows

operating system has only one path of the base directory:
C:/Programs/Assignments;. Please explain what directories you have to
create and where you will put the file Assignment.class.