THE UNIVERSITY OF AUCKLAND

FIRST SEMESTER, 2003

COMPUTER SCIENCE
Principles of Programming

TERMS TEST
(Time allowed: 60 MINUTES)

Surname:	**SOLUTIONS**
Forenames:	
Student ID number:	
Login name (UPI):	

INSTRUCTIONS:

- Attempt **ALL** questions - write your answers in the box provided
- Calculators are **NOT** permitted

LAB GROUP:

- Please circle the ONE lab group session below to which you belong
- When your test is marked, it will be handed back during the lab you specify below

Mon 9-11	**Tue 9-11**	**Wed 9-11**	**Thu 9-11**	**Fri 9-11**
Mon 11-1	**Tue 11-1**	**Wed 11-1**	**Thu 11-1**	**Fri 11-1**
Mon 1-3	**Tue 1-3**	**Wed 1-3**	**Thu 1-3**	**Fri 1-3**
Mon 3-5	**Tue 3-5**	**Wed 3-5**	**Thu 3-5**	
		Wed 5-7		

SURNAME: ..... FORENAMES: .....

RESULTS:

For examiner to complete (DO NOT FILL IN):

Question	Mark	Question	Mark
1	(/20)	**5**	(/10)
2	(/10)	**6**	(/15)
3	(/10)	**7**	(/10)
4	(/15)	**8**	(/10)

TOTAL:	(/100)

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Question 1 (20 marks)

a) What is printed by the following?

```
System.out.println( 3 + 5.3 );
```

8.3

(1 mark)

b) What is printed by the following?

```
System.out.println( 3 / 2 + 1.0 );
```

2.0

(1 mark)

c) What is printed by the following?

```
System.out.println( 1.0 * 3 / 2 );
```

1.5

(1 mark)

d) What is printed by the following?

```
int a = 9;
double b = 1.5;
b = a;
System.out.println( b );
```

9.0

(1 mark)

SURNAME: ..... FORENAMES: .....

e) What is printed by the following?

```
int a = 3;
int b = 2;
a = b;
b = a;
System.out.println( a + b );
```

4

(1 mark)

f) What is printed by the following?

```
System.out.println( 3.5 + (int)3.5 );
```

6.5

(1 mark)

g) What is printed by the following?

```
System.out.println( (double)3 + 2/3 );
```

3.0

(1 mark)

h) What is printed by the following?

```
System.out.println( 20 % 2 );
```

0

(1 mark)

SURNAME: ..... FORENAMES: .....

i) What is printed by the following?

```
System.out.println( 20 % 3 );
```

2

(1 mark)

j) What is printed by the following?

```
System.out.println( 20 % 30 );
```

20

(1 mark)

k) What is printed by the following?

```
System.out.println("Sum = " + 3 + 3.5);
```

Sum = 33.5

(2 marks)

l) What is printed by the following?

```
System.out.println("Sum = \" + 3 + 3.5");
```

Sum = " + 3 + 3.5

(2 marks)

SURNAME: ..... FORENAMES: .....

m) What is printed by the following?

```
System.out.println("\\\"+"+"\\");
```

\"+\

(2 marks)

n) What is printed by the following?

```
System.out.println(Math.max(Math.min(1,4), Math.max(1,2)));
```

2

(2 marks)

o) What is printed by the following?

```
String x = "Hello";
String y = "Joe";
System.out.println(x.length() + y.length());
```

8

(2 marks)

SURNAME: ..... FORENAMES: .....

Question 2 (10 marks)

Using the values given for the variables below, evaluate the following `boolean` expressions:

```
boolean a = true;
boolean b = false;
boolean c = true;
boolean d = false;
int e = 3;
int f = 5;
```

(a) `(a && b) || (a && c)`

true

(2 marks)

(b) `(a || b) && (b || d)`

false

(2 marks)

(c) `(a && !b) && !(!a || d)`

true

(2 marks)

(d) `(e >= f) || ((e+2) < f)`

false

(2 marks)

(e) `(e < f) && (f != e)`

true

(2 marks)

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Question 3 (10 marks)

What is the output when the following code is executed?

```
public class Q3{
public static void main(String[] args){
int num1 = 15;
int num2 = 34;
int num3;
if (num1>4 && num2<22){
num3 = num2-num1;
if (num3>30)
System.out.println("output 1");
else if (num3>20)
System.out.println("output 2");
else
System.out.println("output 3");
System.out.println("output 4");
}
else {
num3 = num2+num1;
if (num3<30)
System.out.println("output 5");
else if (num3<50 || num3%2==1)
System.out.println("output 6");
else
System.out.println("output 7");
System.out.println("output 8");
}
}
}
```

```
output 6
output 8
```

(10 marks)

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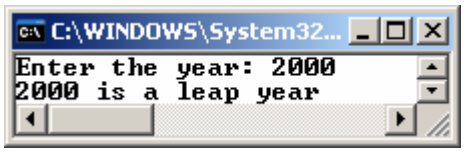
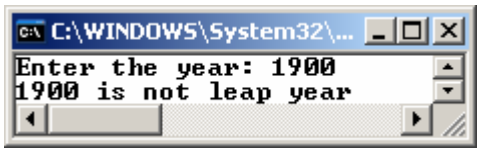
Question 4 (15 marks)

Complete the application below. Your application should ask the user to enter a year. Your application should then print out whether that year was a leap year or not. The following screenshots show two examples of this program:





Remember the rule for determining if a year is a leap year or not: Every year which is evenly divisible by 4 is a leap year, except that a year which is also divisible by 100 is not a leap year, unless it is divisible by 400, in which case it is a leap year after all.

You can assume that the `readInput()` method is provided.

```
import java.io.*;
public class LeapYear {
     public static void main(String[] args) {
          System.out.print("Enter the year: ");
          int year = Integer.parseInt( readInput() );


          if(year%400 == 0)
               System.out.println(year + " is a leap year");
          else if(year%100 == 0)
               System.out.println(year + " is not a leap year");
          else if(year%4 == 0)
               System.out.println(year + " is a leap year");
          else
               System.out.println(year + " is not a leap year");









     }
     //readInput method is declared here
     private static String readInput() {
          ...
     }
}
```

(15 marks)

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Question 5 (10 marks)

What is the output of the following program? You may find it useful to use the desk-checking technique covered in lectures. The space on the facing page can be used to show the diagram you used to desk-check the code (below).

```
public class Q5 {

     public static void main(String[] args) {
          int num = 3;
          method1();
          System.out.println("main() num: " + num);
          System.out.println("main(): " + method2("Test", 1));
     }

     private static String method2(String letters, int i) {
          int num = 2;
          System.out.println("2. letters: " + letters);
          return letters.substring(0,i);
     }

     private static void method1() {
          int num = 5;
          String word = "Happy, Happy, Joy, Joy";
          word = method2(word, num+1);
          System.out.println("1. num: " + num);
     }
}
```

Show the output here:

```
C:/> java Q5



2. letters: Happy, Happy, Joy, Joy
1. num: 5
main() num: 3
2. letters: Test
main(): T
```

(10 marks)

SURNAME: ..... FORENAMES: .....

Show your working here:

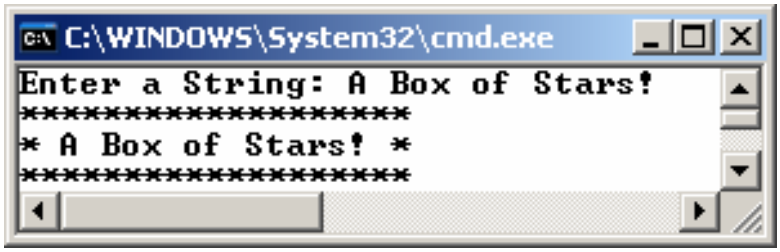
SURNAME: ..... FORENAMES: .....

Question 6 (15 marks)

Complete the application below which asks the user to enter a String, and then prints out the String surrounded by a box of stars (asterisks), as shown by the following screenshot.

Write a method called `printStars()` which will accept an integer number as a parameter. The method should print out a row of stars with the length of the row equal to the parameter.

The `main()` method of your application should use the `printStars()` method to print the top and bottom of the box.




```
import java.io.*;
public class Q6{

     public static void main(String[] args){
          System.out.print("Enter a String: ");
          String input = readInput();

          //COMPLETE THE MAIN METHOD HERE


          printStars(input.length() + 4);
          System.out.println("* " + input + " *");
          printStars(input.length() + 4);









     }//end of the main method

     //Assume the readInput method is declared here
     private static String readInput(){
          ...
     }
```

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```
//WRITE THE PRINTSTARS METHOD HERE

     private static _void_    printStars(_int length_){


          for(int i=0; i<length, i++)
               System.out.print("*");
          System.out.println();









     }//End of the printStars method
}//End of the application
```

(15 marks)

SURNAME: ..... FORENAMES: .....

Question 7 (10 marks)

Examine the application below:

```
public class Q7 {

     public static void main(String[] args) {

          int[] values = new int[10];

          for (int i = 0; i < values.length; i++) {
               values[i] = i%3;
          }

          int count = 0;

          for (int i = 0; i < values.length; i++) {
               if (values[i] == 0)
                    count++;
          }

          System.out.println(count);

     }
}
```

What is the output of the above application?

```
C:\> java Q7

4
```

(10 marks)

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Question 8 (10 marks)

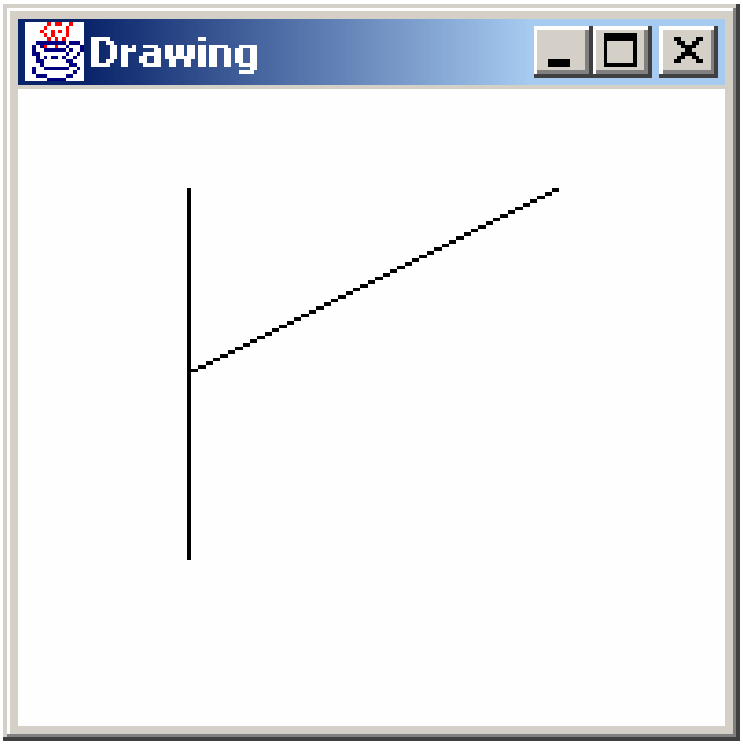
Given the following `paint()` method:

```
public void paint(Graphics g) {

     g.drawLine(50, 50, 50, 150);
     g.drawLine(150, 50, 50, 100);

}
```

Accurately draw what would appear in the `Frame` below for which the `paint()` method above is defined. The window below is 200 pixels wide and 200 pixels high.



(10 marks)