THE UNIVERSITY OF AUCKLAND

SUMMER SCHOOL, 2002

COMPUTER SCIENCE
Principles of Programming

TERMS TEST
(Time allowed: 75 MINUTES)

Surname:	
Forenames:	
Student ID number:	
Lab time:	***Circle ONE of the following:*** **Thursday 11-1** **Friday 11-1** **Thursday 1-3** **Friday 1-3** **Thursday 3-5** **Friday 3-5**

INSTRUCTIONS:

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

Examiner to complete:

Question	Mark
1	(/10)
2	(/10)
3	(/10)
4	(/10)
5	(/10)

Question	Mark
6	(/6)
7	(/6)
8	(/6)
9	(/10)
10	(/7)
11	(/15)

TOTAL: (/100)

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

Question 1 (10 marks)

a) What would be printed out by the following code segment?

```
String s1 = new String("character");
String s2 = s1.substring(4,5);
int i = s1.indexOf(s2);
System.out.println(i + s1.substring(6,9));
```

(1 mark)

b) What is printed by the following?

```
System.out.println(1 + 2 + "." + 3 + 4);
```

(1 mark)

c) Would the following code compile, or is there a syntax error (circle the correct answer)?

```
int i = Integer.parseInt(String.valueOf(8));
```

THE CODE WILL COMPILE / SYNTAX ERROR

(1 mark)

d) What is the output of the following code segment?

```
System.out.print(1);
System.out.println(2);
System.out.print(3 + "\n");
System.out.println(4);
System.out.print(5);
System.out.println(6);
```

(2 marks)

CONTINUED

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e) Write a **single** `System.out.println()` statement that produces the two lines of output exactly as shown below:

```
\n\
\\n
```

```
System.out.println(                                          );
```

(1 mark)

f) What is the output of the following code segment?

```
int i = 8%17;
i = i * 10;
System.out.println("i is: " + i);
```

(1 mark)

g) What is the output of the following code segment?

```
double d = 25/10;
d = d + 2.5;
System.out.println("d is: " + d);
```

(1 mark)

h) What is the output of the following code segment:

```
int i = 1 / 2 + 3 / 4 - 5 * 6 - (7 + 8) * 9;
System.out.println(i);
```

(1 mark)

i) What is the output of the following code segment:

```
String s1 = "Hello";
String s2 = s1;
s1 = s2.substring(0,1);
System.out.println(s2.length());
```

(1 mark)

CONTINUED

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

Question 2 (10 marks)

You need to locate and correct the errors in the application `Q2`. What the application is supposed to do is prompt the user to enter their name and a number. You can assume that the number the user enters is an integer between 1 and 15.

The application should then print the user's name to the screen, surrounded by the specified number of stars on the left and the specified number of stars on the right. There should be a single space character on either side of the name, separating it from the stars.

For example, the following screenshots show possible output when this application is run:

```
C:/> java Q2
Enter name: Paul
Enter number: 3
*** Paul ***
```

```
C:/> java Q2
Enter name: Adriana
Enter number: 5
***** Adriana *****
```

```
C:/> java Q2
Enter name: Ann
Enter number: 10
********** Ann **********
```

The source code for the application `Q2` is given over the page, however it is not correct - it contains 4 syntax errors and 1 logic error.

You need to locate the syntax errors and the logic error in the source code. For each error you must clearly circle the error and also provide a correction. You do not need to write out the whole line of source code again, as long as you indicate your correction clearly.

NOTES:
- There are no errors in the `readInput()` method
- You can assume the user enters an integer between 1 and 15 when prompted to enter a number

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```
public class Q2 {

     private static void printWithStars(String s, int numStars) {

          String allStars = '************************************';

          String stars = allStars.substring(0, numStars-1);

          System.out.println(stars + " " + s " " + stars);

     }

     public static main(String[] args) {

          System.out.print("Enter name: ");

          String name = readInput();

          System.out.print("Enter number: ");

          String number = readInput();

          int num = Integer.parseInt(number);

          printWithStars(name, number);

     }

     private static String readInput() {
          try {
               BufferedReader in = new BufferedReader(
                    new InputStreamReader(System.in));
               return in.readLine();
          }
          catch (IOException e) {}
          return "";
     }
}
```

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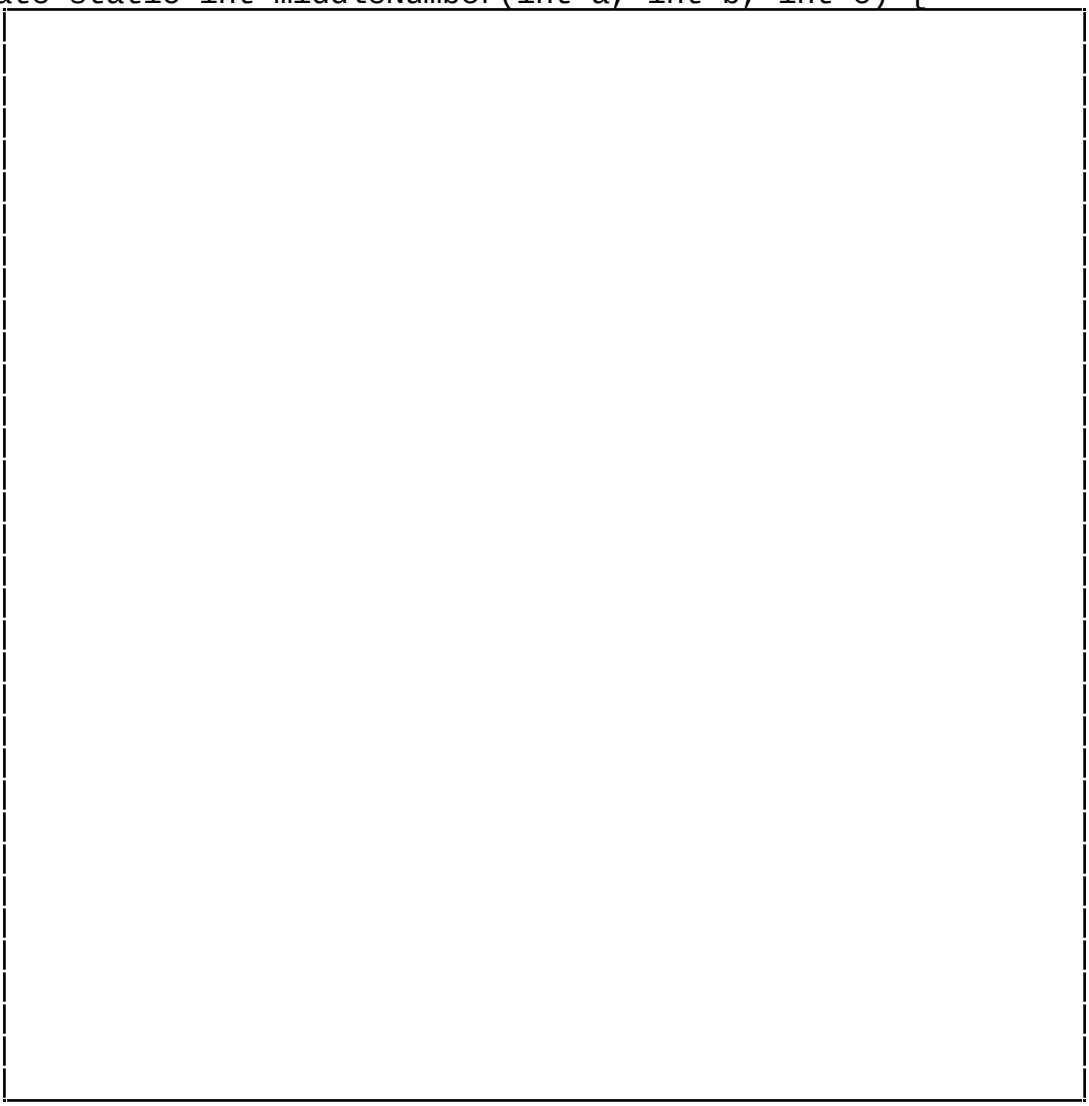
Question 3 (10 marks)

Complete the `middleNumber()` method below. This method is passed 3 integers as parameters, and returns the number which lies in the middle of the 3 when considerd in numerical order.

```
private static int middleNumber(int a, int b, int c) {
```



```
}
```

The method must work for any integer values that are passed to it as parameters. For example, if the following method call was made:

```
middleNumber(2, 4, 3)
```

the method should return the value 3, which is the middle of the three parameter values.

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Question 4 (10 marks)

What is the output of the following application?

```
public class Q4 {

     private static void yes(int a, int b) {
          System.out.println(a);
     }

     private static void yes(double a, double b) {
          System.out.println(b);
     }

     private static int no(double d) {
          System.out.print("no: ");
          yes(d, d);
          return (int)d;
     }

     private static double maybe(int i) {
          i = no(i + 1.5);
          return i/2;
     }

     public static void main(String[] args) {
          yes(1.5, 2);
          int i = no(10.1);
          double d = maybe(20);
          System.out.println(i * d);
     }

}
```

(10 mark)

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Question 5 (10 marks)

Complete the `randomOddDigit()` method below which should return a random odd digit (either 1, 3, 5, 7, or 9).

```
public class Q5 {

     private static int randomOddDigit() {

     }

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

NOTE:

- The `randomOddDigit()` method must return either 1, 3, 5, 7 or 9 each time it is called. Each digit should have the same probability of being returned.
- If you complete the `randomOddDigit()` method correctly, the output of the above application `Q5` might be similar to the following:

```
C:\> java Q5
3
7
1

C:\> java Q5
9
9
5
```

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Question 6 (6 marks)

What is the output when the following application is executed?

```
public class Q6 {

     public static void main(String[] args) {

          boolean isReady = false;
          int num1, num2;
          num1 = 20;
          num2 = 30;

          if (num1<20 && num2>15) {
               if(isReady)
                    System.out.println("Line 1");
               else
                    System.out.println("Line 2");
               System.out.println("Line 3");
          }

          else if (!(num1<20 || num2>30)) {
               if(isReady)
                    System.out.println("Line 4");
               else
                    System.out.println("Line 5");
               System.out.println("Line 6");
          }

          if (num1<100 || num2>30) {
               if(!isReady)
                    System.out.println("Line 7");
               else
                    System.out.println("Line 8");
               System.out.println("Line 9");
          }

          System.out.println("Line 10");
     }
}
```

CONTINUED

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

Question 7 (6 marks)

Write a method, `printLuckyColour()`, which first generates a random integer between 0 and 6 inclusive and then prints a message to the DOS window depending on the value of the random number.

- If the random number is either 0 or 1 then the message printed is "`Lucky colour: green`"
- If the value of the random number is 2, 3 or 4 then the message is "`Lucky colour: red`"
- Otherwise the message is "`Lucky colour: blue`".

```
public static void printLuckyColour() {
}
```

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Question 8 (6 marks)

What is the output when the following application is executed?

```
public class Q8 {

     public static void main(String[] args) {

          boolean b1 = 6 < 10;
          boolean b2 = true;
          boolean b3 = !b1;
          b1 = 10 > 6 && b2;

          System.out.println("b1: "+b1);
          System.out.println("b2: "+b2);
          System.out.println("b3: "+b3);

     }
}
```

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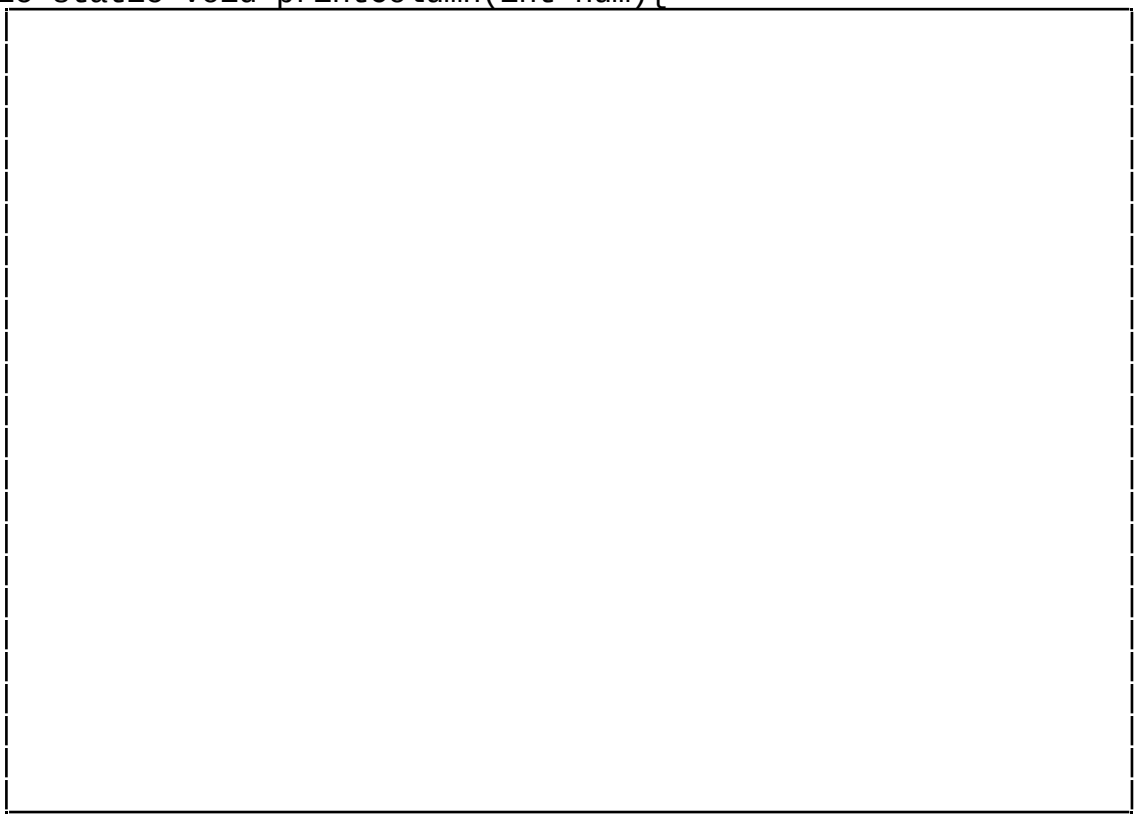
Question 9 (10 marks)

Complete the method, `printColumn()`, which prints two columns of numbers to the DOS window. The method takes one parameter, `num`, which is the start number for the left hand column. The number on the left of each row decreases from the start number down to 1 and the number on the right of each row increases from 1 up to the start number. In each row the numbers are separated by a dash.

```
public static void printColumn(int num){
```



```
}
```

For example, if the following three calls to the `printColumn()` method are made:

```
printColumn(3);
printColumn(5);
printColumn(4);
```

the following output is obtained:

```
3 – 1
2 – 2
1 – 3

5 – 1
4 - 2
3 – 3
2 – 4
1 – 5

4 - 1
3 – 2
2 – 3
1 – 4
```

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Question 10 (7 marks)

What is the output when the following application is executed?

```
public class Q10 {
     public static void main(String[] args) {
          String str;
          StringTokenizer st = new StringTokenizer("The gentle art
                                                        of breathing");
          while (st.hasMoreTokens()) {
               str = st.nextToken();
               if (str.length() > 3)
                    System.out.println(str);
          }
}
```

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Question 11 (15 marks)

The following application, `Q11`, uses a class of type `Locker`:

```
import java.io.*;
import java.util.*;

public class Q11 {

     public static void main(String[] args) {

          Locker lock1, lock2, lock3;
          lock1 = new Locker("Jean Jones",3,234);
          lock2 = new Locker("Tom Brown",3,205);
          lock3 = new Locker("Tom Brown",2,25);

          System.out.println(lock1.toString());
          System.out.println(lock2.toString());
          System.out.println(lock3.toString());
          System.out.println();

          lock1.setIsVacant(true);
          if (lock1.getIsVacant())
               System.out.println("NOW VACANT "+lock1.toString());

          System.out.println();
          if (lock2.hasSameHirer(lock3)) {
               System.out.println("SAME HIRER "+lock2.toString());
               System.out.println("SAME HIRER "+lock3.toString());
          }
     }
}
```

When the `Q11` application is executed (using the completed `Locker` class) the output displayed below is obtained:

```
C:\q11> java Q11
Floor 3, Locker number: 234  Currently hired by: Jean Jones
Floor 3, Locker number: 205  Currently hired by: Tom Brown
Floor 2, Locker number: 25  Currently hired by: Tom Brown

NOW VACANT Floor 3, Locker number: 234  Currently vacant.

SAME HIRER Floor 3, Locker number: 205  Currently hired by: Tom Brown
SAME HIRER Floor 2, Locker number: 25  Currently hired by: Tom Brown
```

Complete the definition of the `Locker` class (on the following page) so that the application executes as shown.

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```
public class Locker{
```

```
}
```

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OVERFLOW PAGE (will NOT be marked)

APPENDIX:

Useful methods and variables:

String

```
public int indexOf(char c)
public int indexOf(String string)
public char charAt(int index)
public String substring(int beginIndex, int endIndex)
public int length()
public boolean equals(String comparison)
```

StringTokenizer

```
public boolean hasMoreTokens()
public String nextToken()
```

Math

```
public static double random()
```

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ANSWERS

QUESTION 1

a) `2ter`
b) `3.34`
c) THE CODE WILL COMPILE
d)
```
12
3
4
56
```
e) `System.out.println("\\n\\\n\\\\n");`
f) `i is: 80`
g) `d is: 4.5`
h) `-165`
i) `5`

QUESTION 2

4 syntax errors:

1) `String allStars = '**********************************';`
   single quotes, should be double quotes
2) `System.out.println(stars + " " + s + " " + stars);`
   missing concatenation operator after the `s`
3) `public static void main(String[] args) {`
   missing word `void`
4) `printWithStars(name, number);`
   variable `number` should be `num`

1 logic error:

5) `String stars = allStars.substring(0, numStars-1);`
   `numStars-1` should be `numStars`

QUESTION 3

```
private static int middleNumber(int a, int b, int c) {
     int max = Math.max(a, Math.max(b, c));
     int min = Math.min(a, Math.min(b, c));
     return (a+b+c) - (max+min);
}
```

QUESTION 4

```
2.0
no: 10.1
no: 21.5
100.0
```

QUESTION 5

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```
    private static int randomOddDigit() {
         int num = (int)(Math.random() * 5);
         return num*2 + 1;
    }
```

QUESTION 6

QUESTION 7

QUESTION 8

QUESTION 9

QUESTION 10