THE UNIVERSITY OF AUCKLAND

SECOND SEMESTER, 2011
Campus: City

COMPUTER SCIENCE

TEST

Principles of Programming

(Time Allowed: 75 minutes)

NOTE:
You must answer **all** questions in this test.
No calculators are permitted
Answer in the spaces provided in this booklet.
There is space at the back for answers that overflow the allotted space.

Surname	
Forenames	
Student ID	
Login (UPI)	
Lab Time	

Q1 (/10)	**Q4** (/9)	**Q7** (/13)	**Q10** (/7)
Q2 (/8)	**Q5** (/15)	**Q8** (/10)	**Total**
Q3 (/10)	**Q6** (/6)	**Q9** (/12)	/100

ID: .....

Question 1 (10 marks)

a) What output is produced when the following code is executed?

```
System.out.println(4 + 3 * (5 / 3)  + " * " + (4 - 3) + 1);
```

(2 marks)

b) Complete the output produced when the following code is executed.

```
int a = 4;
int b = a;

a++;
b = a;
a = a - 2;
b = 10 * a - b;

System.out.println("a: " + a  + " b: " + b);
```

a: b:

(2 marks)

ID: .....

c) Complete the output produced when the following code is executed.

```
int a = 15;
int b = 7;

int c = a % a;
int d = b % (b + 2);
int e = a % b;

int sum = c + d + e;

System.out.println("Sum: " + sum);
```

Sum:

(2 marks)

d) Complete the output produced when the following code is executed.

```
double num1 = 27.6;
int num2 = (int) num1;
double num3 = 5 / 10;

System.out.println("num2: " + num2);

System.out.println("num3: " + num3);
```

num2:

num3:

(2 marks)

continued

ID: .....

e) Complete the output produced when the following code is executed.

```
int a = 3;
int b = 12;
int c = 6;
int d = 1;

System.out.println("1: " + (c + 2 * a));

System.out.println("2: " + (d - b / c));
```

```
1:

2:
```

(2 marks)

ID: .....

Question 2 (8 marks)

Parts a), b) and c) refer to the following code.

```
int value = ...

if ((value < 10 || value > 30) && !(value == 0)) {
    System.out.println("A");
} else if (value > 15 && value < 25) {
    System.out.println("B");
} else if (value < 16) {
    System.out.println("C");
} else if (value > 25) {
    System.out.println("D");
} else {
    System.out.println("E");
}
```

a) What is the output if the variable, `value`, is assigned 14?

(2 marks)

b) What is the output if the variable, `value`, is assigned 0?

(2 marks)

c) What is the output if the variable, `value`, is assigned 25?

(2 marks)

continued

ID: .....

d) Write a `boolean` expression which tests whether the `int` variable, `score`, contains a value between 10 and 20 (both inclusive).

(2 marks)

continued

ID: .....

Question 3 (10 marks)

a) The program below contains the `display()` method. In the `start()` method make a call to the `display()` method. Your call to the `display()` method can produce any output but it must compile.

```
public class CallDisplay () {
    public void start() {
```

(2 marks)

```
    }
    private void display(String title, char initial,
                                       boolean inShortForm) {
       int pos = title.length() - 1;
       if (inShortForm) {
          System.out.println(""+ title.charAt(0) +
                   title.charAt(pos) + ". "+ initial + "");
       } else {
          System.out.println(title + initial + "");
       }
    }
}
```

b) Give two different numbers which could be output by the following code:

```
int number = (int)(Math.random() * 2 - 2);
System.out.print(number);
```

(2 marks)

ID: .....

c) Complete the output produced when the following program is executed.

```
public class ValuePrinting () {
    public void start() {
       printAValue(3, 2);
    }
    private void printAValue(double num1, double num2) {
       double result = Math.pow(num1, num2);
       System.out.println("Result: " + result);
    }
}
```

Result:

(2 marks)

d) What output is produced when the following code is executed?

```
int num1 = 1;
int num2 = 2;
int num3 = 3;
int num4 = 4;

int num5 = Math.min( Math.max(num1, num2),
                                    Math.max(num3, num4));

int num6 = Math.max(Math.min(num1, num2),
                                       Math.min(num3, num4));

int num7 = Math.max(num5, num6);

System.out.println(num5 + ", "+ num6 + ", "+ num7);
```

continued

(2 marks)

e) Write the following formula in Java:

$$\text{result} = a^2 + 2bc$$

Note: you can assume that the variables, `a`, `b` and `c` have been assigned values.

```
int a = ...
int b = ...
int c = ...
```

```
double result =
```

(2 marks)

ID: .....

Question 4 (9 marks)

Complete the method header for the following three methods (i.e., complete the first line of the method definition).

a) The method, `methodA()`, is called in the following way:

```
char result = methodA("Exquisite");
```

```
private _____________ methodA( _____________________ ) {

       int position = word.length() - 1;
       return word.charAt(position);
}
```

(3 marks)

b) The method, `methodB()`, is called in the following way:

```
methodB("Starry", 20);
```

```
private _____________ methodB( _____________________________

                               _____________________________ ) {
       final String PADDING = "********************
                                ************************";
       if (word.length() >= length) {
          System.out.println(word);
       } else {
          int numberRequired = length - word.length();
          String pad = PADDING.substring(0, numberRequired);
          System.out.println(pad + word);
       }
}
```

(3 marks)

continued

ID: ....

c) The method, `methodC()`, is called in the following way:

```
boolean result = methodC(34, 42);
```

```
private ________________ methodC( _________________________

                                 ______________________________ ) {
        int result = number1 - number2;
        return result > -1;
}
```

(3 marks)

ID: .....

Question 5 (15 marks)

a) What is the output produced when the following code is executed?

```
for (int i = 10; i > 4; i = i - 2) {
    System.out.println(i);
}
```

(3 marks)

b) Convert the following `while` loop into its corresponding `for` loop.

```
int index = 1;
while (index <= 9) {
    System.out.println(index * index);
    index = index + 1;
}
```

(3 marks)

continued

ID: .....

c) What output is produced by the following code? If there is no output, please give the reason why.

```
for (int i = 1; i <= 10; i++) {
    int sum = sum + i;
}

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

(3 marks)

d) Complete the output produced when the following code is executed.

```
int[] a = {7, 2, 11, 28, 12, 9};
int[] b;

b = a;
b[3] = 79;

System.out.println("Result: " + a[3]);
```

Result:

(3 marks)

e) Complete the output produced when the following code is executed.

```
String[] words = {"the", "quick", "brown", "fox", "jumps",
                              "over", "the", "lazy", "dog" };

for (int i = 0; i < words.length - 1; i++) {
    if (words[i].length() < 5) {
       System.out.println(words[i]);
    }
}
```

(3 marks)

ID: .....

Question 6 (6 marks)

a) Complete the output produced when the following code is executed.

```
String str = "Java Programming!";
System.out.println("1. "+ str.length());
System.out.println("2. "+ str.indexOf("m"));
System.out.println("3. "+ str.charAt(6));
```

```
1:

2:

3:
```

(3 marks)

b) Complete the output produced when the following code is executed.

```
String str = "Java Programming!";
System.out.println("1. "+str.substring(5, 8));
System.out.println("2. "+str.equals("Java Programming!"));
String rearranged = str.charAt(str.length() - 1) +
                    str.substring(0,str.length() - 1);
System.out.println("3. " + rearranged);
```

```
1:

2:

3:
```

(3 marks)

continued

ID: .....

Question 7 (13 marks)

Parts a), b) and c) refer to the `display()` method below:

```
public void display(int temp) {
    if (temp > 90) {
       System.out.println("Hot");
    }
    if (temp < 70) {
       System.out.println("Cold");
    }
    System.out.println("Just right");
}
```

a) What is the output produced when the following call is made to display() method?

```
display(75);
```

(2 marks)

b) What is the output produced when the following call is made to `display()` method?

```
display(100);
```

(2 marks)

continued

ID: .....

c) What is the output produced when the following call is made to `display()` method?

```
display(40);
```

(2 marks)

d) Complete the `getFeeling()` method which is passed an `int` parameter and returns a String. The method returns the String:

"Sad" when the parameter, score, is less than 20,
"Happy" when the parameter, score, is greater than 80,
"So-So" when the parameter, score, is between 40 and 70 (both inclusive),
and
"Not sure" at all other times.

```
private String getFeeling(int score) {
```

(7 marks)

```
}
```

continued

ID: .....

Question 8 (10 marks)

Complete the `PrintYearlyRent` program which:

- prompts the user for the weekly rent amount,
- reads the number entered by user,
- converts the weekly rent amount into yearly rent amount

and

- finally prints the information.

Below is an example showing how the program should execute. The user input is shown in bold.

```
Enter weekly rent: $100
Yearly rent $5200
```

Write your code in the start() method below.

```
public class PrintYearlyRent() {
  public void start() {
     final int WEEKS_IN_YEAR = 52;
```

continued

ID: .....

(10 marks)

```
    }
}
```

ID: .....

Question 9 (12 marks)

a) In the `start()` method below, write Java code which declares and creates an integer array of size 24 and then sets each element inside the array to be two times its index, e.g., the element in position 6 of the array has the value 12, the element at position 7 of the array has the value 14, etc. The name of the array variable should be `nums`.

```
public class CreateArray () {
    public void start() {
```

(6 marks)

```
    }
}
```

continued

ID: .....

b) The `getMax()` method is passed an integer array as a parameter. The method returns the maximum value of all the elements in the array. Complete the code.

Note: you may assume that the parameter array contains at least one element.

```
private int getMax(int[] nums) {
```

(6 marks)

```
}
```

ID: .....

Question 10 (7 marks)

Parts a), b) and c) require you to complete the `Score` class definition below.

```
public class Score {
    private String captain;
    private int totalScore;

    public Score(String captain, int score) {
       this.captain = captain;
       totalScore = score;
    }
```

```
    public               getCaptain() {




    }
```

(1 mark)

```
    public               setCaptain(                ) {




    }
```

(1 mark))

```
    public void addToScore(int score) {
       totalScore = totalScore + score;
    }
```

```
    public               setTotalScore(                ) {




    }
```

(1 mark))

```
    public int getTotalScore() {
       return totalScore;
    }

    public String toString() {
       return captain + ", Score: " + totalScore;
    }
}
```

continued

ID: .....

a) In the `Score` class above complete the mutator method, `setCaptain()`.

b) In the `Score` class above complete the accessor method, `getCaptain()`.

c) In the `Score` class above complete the mutator method, `setTotalScore()`.

d) Complete the output produced when the following code is executed using the completed `Score` class.

```
Score s1 = new Score("Ted", 6);
Score s2 = new Score("Alice", 8);

System.out.println("1. "+ s1.toString());
System.out.println("2. "+ s2.toString());

s1.addToScore(4);
s2.addToScore(3);

s2.setCaptain("Betty");
s1.addToScore(s1.getTotalScore());

System.out.println("3. "+ s1.toString());
System.out.println("4. "+ s2.toString());
```

```
1:

2:

3:

4:
```

(4 marks)

continued

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ROUGH WORKING (WILL NOT BE MARKED)

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ROUGH WORKING (WILL NOT BE MARKED)

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