THE UNIVERSITY OF AUCKLAND

SUMMER SEMESTER, 2012
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 space provided in this booklet.
There is space at the back for answers that overflow the allotted space.

Surname	
Forenames	
Student ID	
Login (UPI)	
Lab Times	

Q1 (/10)	**Q4** (/16)	**Q7** (/10)
Q2 (/12)	**Q5** (/20)	**Total** /100
Q3 (/12)	**Q6** (/20)	

ID: .....

Question 1 (10 marks)

a) What is the output produced by the following code?

```
System.out.println(3 + 5 + " + " + 2 + " + " + 8 + ("2" + 1) + 3);
```

(2 marks)

b) What is the output produced by the following code?

```
System.out.println("An\"B\\n\"N");
```

(2 marks)

c) Complete the output produced by the following code.

```
int num;
num = Math.min(Math.max(Math.min(3, 6), Math.min(21, 5)),
                                                Math.max(3,4));
System.out.println("num: " + num);
```

num:

(2 marks)

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d) Complete the output produced by the following code:

```
int a = 3;
int b = 4;
int c = a + b;

b = c - b;
a = a + c;
c = c + 2;

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

```
a:          b:          c:
```

(2 marks)

e) Complete the output produced by the following code:

```
int a = 2 + 7 % 3;
int b = 8 % 11;
double c = 15 / 4;

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

```
a:          b:          c:
```

(2 marks)

ID: .....

Question 2 (12 marks)

a) Complete the output produced by the following code:

```
int number = 9;
boolean result = ! ( ! (number < 0) && ! (number >= 3));
System.out.println("result: " + result);
```

```
result:
```

(2 marks)

b) What is the output produced by the following code?

```
int value1 = 8;
int value2 = 6;
System.out.print("A ");

if (value1 > value2 + 2) {
      System.out.print("B ");
      value2 = value1 + 2;
} else if (value2 > value1 - 3) {
      System.out.print("C ");

      if(value1 < 8) {
          System.out.print("D ");
      } else {
          value1++;
      }

      value2 = value2 / 2;
}

System.out.println(value1 + " " + value2);
```

(2 marks)

ID: .....

c) What is the output produced by the following code?

```
int value1 = 8;
int value2 = 6;

System.out.print("A ");

if (value1 < value2) {
      System.out.print("B ");
      value1 = 10;
}

if (value2 < 10) {
      System.out.print("C ");

      if(value1 < 9) {
         System.out.print("D ");
      } else {
         value2++;
      }
}

System.out.println(value1 + " " + value2);
```

(2 marks)

d) What is the output produced by the following code?

```
String diceValues = "23456234";
int position = diceValues.indexOf("1");

if (position > -1) {
      System.out.println("Stop " + position);
} else {
      System.out.println("Go " + position);
}
```

(2 marks)

ID: .....

e) What is the output produced by the following code?

```
String word = "WHAT HAPPENS IF YOU GET SCARED HALF
                                          TO DEATH TWICE?";

String result = "" + word.charAt(0) +
                          word.charAt(word.length() - 6);

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

(2 marks)

f) What is the output produced by the following code?

```
String phrase = "If things get any worse, I'll have to
                              ask you to stop helping me";

String shorter = phrase.substring(0, 4) + " ... " +
                  phrase.substring(phrase.length() - 4);

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

(2 marks)

ID: .....

Question 3 (12 marks)

For parts a), b) and c) you are required to complete the method header for each method (i.e., complete the first line of each method definition).

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

```
methodA(10, true);
```

```
private _____________ methodA (____________________

                      ___________________________) {
    int bigger = value;

    if (addExtra) {
         bigger = bigger + value / 4;
    }

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

(3 marks)

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

```
String result2 = methodB(2, "3462");
```

```
private _____________ methodB (____________________

                      ___________________________) {
    int digit = Integer.parseInt("" +
                                    word.charAt(0));
    digit = digit + num;
    digit = digit % 10;
    word = digit + word.substring(1);

    return word;
}
```

(3 marks)

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

```
boolean result3 = methodC(2, 34, 56);
```

```
private _____________ methodC (_____________________

                      ___________________________________) {

    return num1 < num2 && num2 < num3;

}
```

(3 marks)

d) 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 PrintResult () {
   public void start() {
```

```

```

(3 marks)

```
   }

   private void display(boolean inShortForm,
                        char initial, String title) {

      int pos = title.length() - 1;

      if (inShortForm) {
         System.out.println(""+ title.charAt(0) +
                     title.charAt(pos) + ". " + initial);
      } else {
         System.out.println(title + " " + initial);
      }
   }
}
```

ID: .....

Question 4 (16 marks)

a) Complete the method, `getRandomDay(),` which returns a String. The method randomly returns either the String `"Yesterday"` or the String `"Today"` or the String `"Tomorrow"`. Each of the three Strings must have an equal chance of being returned by the method.

```
private String getRandomDay() {

    String day1 = "Yesterday";
    String day2 = "Today";
    String day3 = "Tomorrow";









}
```

(6 marks)

b) Complete the method, `displayInStars()`, which is passed two Strings as parameters. The method prints two stars, followed by the first letter of the first String parameter, followed by a star, followed by the first letter of the second String parameter followed by two stars. For example, the following three lines of code:

```
displayInStars("mary", "Wang");
displayInStars("Jo", "Blo");
displayInStars("ming", "smith");
```

would print:

```
**m*W**
**J*B**
**m*s**
```

```
private void displayInStars(String first,
                                        String second) {









}
```

(5 marks)

c) Complete the method, `isEnoughFunds()`, which is passed three `int` parameters. The method should return `true` if the third parameter, `amount`, is greater than or equal to the product of the first two parameters, `false` otherwise. For example, the following code:

```
boolean isEnough = isEnoughFunds(12, 4, 100);
System.out.println(isEnough);
isEnough = isEnoughFunds(12, 4, 48);
System.out.println(isEnough);
isEnough = isEnoughFunds(12, 4, 30);
System.out.println(isEnough);
```

should print:

```
true
true
false
```

ID: .....

```
private boolean isEnoughFunds(int costPerItem,
                      int numberOfItems, int amount) {









}
```

(5 marks)

ID: .....

Question 5 (20 marks)

a) The following code uses a `for` loop.

```
int count = 1000;

for (int i = 100; i > 0; i = i - 4) {
    count = count - i;
}

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

Complete the code below so that it is exactly the same as the code above but it uses a **`while`** loop.

```
int count = 1000;









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

(4 marks)

b) Give TWO **different** possible outputs which could be produced by the following program.

```
public class PrintNumbers () {
  public void start() {
      printRandoms();
  }

  private void printRandoms() {
      int value;

      for (int i = 2; i < 8; i = i + 2) {
          value = (int) (Math.random() * 2 + 3);
          System.out.print(value + " ");
      }

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

Possible output 1:

Possible output 2:

(8 marks)

c) Complete the following `getFourLetterWord()` method below. The method keeps prompting the user for a four letter word until the user enters a word with exactly four letters. For example, a call to the `getFourLetterWord()` method could produce the following (the user input is displayed in bold):

```
Enter a 4 letter word: chocolate
Enter a 4 letter word: lollies
Enter a 4 letter word: cakes
Enter a 4 letter word: ice cream
Enter a 4 letter word: nuts
```

and, as another example, the following output could be produced if the user enters a four letter word at the first prompt:

```
Enter a 4 letter word: cake
```

```
private String getFourLetterWord () {
   String prompt = "Enter a 4 letter word: ";

   String word = "";









   return word;
}
```

(8 marks)

ID: .....

Question 6 (20 marks)

a) Write a Java statement which declares and creates a `double` array big enough to hold 100 elements. The name of the array variable is `numbers`.

(2 marks)

b) Continuing from part a) above, write two statements which assign 24.5 to the first element of the `numbers` array and 23.8 to the last element of the `numbers` array.

(3 marks)

c) Complete the output produced by the following code.

Note: the `printIntArray()` method prints the elements of an `int` array on one line with each element separated by a comma followed by a space. The code for the method is not shown.

```
int[] nums = {9, 4, 7, 3, 2, 1, 7};

System.out.println("A.");
printIntArray(nums);

nums[0] = nums[4];
nums[4] = nums[6];
nums[6] = nums[0];

nums[2]++;
nums[5]--;
nums[3] = nums[3] + 5;

System.out.println();
System.out.println("B.");
printIntArray(nums);
```

```
A.
9, 4, 7, 3, 2, 1, 7

B.
```

(7 marks)

ID: .....

d) Complete the method, `moveElementsDown()`, which is passed an `int` array of any length as a parameter. The method moves each element of the array down one position, i.e., the element at position 1 becomes the element at position 0, the element at position 2 becomes the element at position 1, etc. Finally 0 is assigned to the last element of the array.

Note: the `printIntArray()` method prints the elements of an `int` array on one line with each element separated by a comma followed by a space. The code for the method is not shown.

For example, the following code:

```
int[] nums = {1, 2, 3, 4, 5, 6, 7};
printIntArray(nums);
moveElementsDown(nums);
printIntArray(nums);
```

would print:

```
1, 2, 3, 4, 5, 6, 7
2, 3, 4, 5, 6, 7, 0
```

```
private void moveElementsDown(int[] nums) {









}
```

(8 marks)

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Question 7 (10 marks)

The `Questions` class definition below is incomplete. Code which uses the `Questions` class is shown on the next page.

```
public class Questions {
  private int numberOfQuestions;
  private int numberCorrect;
  private String name;

  public Questions(String name) {
     this.name = name;
     numberOfQuestions = 0;
     numberCorrect = 0;
  }
```

```
public            setName(                    ) {


}
```

```
public            getNumberCorrect() {


}
```

```
  public void addToNumberCorrect(int correct) {
     this.numberCorrect = this.numberCorrect + correct;
  }

  public void addResults(int correct, int numberQs) {
     numberOfQuestions = numberOfQuestions + numberQs;
     this.numberCorrect = this.numberCorrect + correct;
  }

  public String toString() {
     String info = name + " " + numberCorrect + "/" +
                                          numberOfQuestions;
     if (numberOfQuestions > 10 &&
                  numberCorrect > numberOfQuestions - 3) {
        info = info + " Excellent!";
     }
     return info;
  }
}
```

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The code below uses the completed `Questions` class.

```
Questions mingQs = new Questions("Ming");
Questions johnQs = new Questions("John");

mingQs.addResults(8, 10);

System.out.println("1." + mingQs.toString());
System.out.println("2." + johnQs.toString());

mingQs.addResults(4, 5);
johnQs.addResults(15, 20);

System.out.println("3." + mingQs.toString());
System.out.println("4." + johnQs.toString());

mingQs.addToNumberCorrect(2);
johnQs.addResults(6, 10);

System.out.println("5." + mingQs.toString());
System.out.println("6." + johnQs.toString());
```

a) Complete the output when the above code is executed:

1.

2.

3.

4.

5.

6.

(6 marks)

b) In the space provided on page 16 of this test, complete the `setName()` mutator method.

(2 marks)

c) In the space provided on page 16 of this test, complete the `getNumberCorrect()` accessor method.

(2 marks)

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OVERFLOW PAGE

(If you have used this page, please indicate clearly under the relevant question that you have overflowed to this page)

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

ROUGH WORKING (WILL NOT BE MARKED)

(You may detach this page from the answer booklet and use it for rough working)

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

ROUGH WORKING (WILL NOT BE MARKED)

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