

THE UNIVERSITY OF AUCKLAND

SUMMER SEMESTER, 2009

Campus: City

COMPUTER SCIENCE

TEST

Principles of Programming

(Time allowed: 75 MINUTES)

NOTE: Attempt **ALL** questions

Write your answers in the space provided

There is space at the back for answers that overflow the allotted space

No calculators are permitted

Surname:	
Forenames:	
Student ID number:	
Login name:	

Q1	Q3	Q5	Q7
(/40)	(/20)	(/10)	(/10)
Q2	Q4	Q6	TOTAL
(/5)	(/10)	(/5)	(/100)

CONTINUED

SURNAME: FORENAMES:

Question 1 (40 marks)

a) What output is produced by the following code?

```
String sentence = "I LOVE SUMMER SCHOOL!";  
String part = sentence.substring(7, 10);  
System.out.println(part);
```

(2 marks)

b) What output is produced by the following code?

```
String sentence = "Summer school is intensive!";  
int index = sentence.indexOf("x");  
System.out.println(index);
```

(2 marks)

c) What would be printed by the following?

```
String sentence = "Programming is fun!";  
System.out.println(sentence.length());
```

(2 marks)

SURNAME: FORENAMES:

d) What output is produced by the following code?

```
String a, b;  
a = new String("Hello World!");  
b = a;  
System.out.println(a + b.charAt(11));
```

(2 marks)

e) List all possible values that could be generated by the following expression:

```
(int) (Math.random() * 4) + 3
```

(2 marks)

f) What would be printed by the following?

```
System.out.println(Math.min(5, Math.max(3, 7)));
```

(2 marks)

SURNAME: FORENAMES:

g) What output is produced by the following code?

```
System.out.println(2 + 4 + "8" + 9 + (2 + 4));
```

(2 marks)

h) What output is produced by the following code? Assume the user's input is 23.

```
System.out.println(Keyboard.readInput() + 7);
```

(2 marks)

i) What output is produced by the following code? Assume the user's input is 21.

```
System.out.print(9 + Integer.parseInt(Keyboard.readInput()));
```

(2 marks)

SURNAME: FORENAMES:

- j) Write a Java boolean expression which tests whether the value of the variable `score` is outside of the range 3 to 75 (inclusive) but is not equal to 99.

(2 marks)

- k) What is printed by the following?

```
System.out.println(4 + "\n6" + 3 * 1 + 1);
```

(2 marks)

- l) What is printed by the following?

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

(2 marks)

SURNAME: FORENAMES:

m) Will the following code compile? Tick the correct box.

```
public class MyProgram {  
    public void start() {  
        int number = 4;  
  
        methodOne(number);  
  
        System.out.println("1 Number: " + number);  
    }  
  
    private void methodOne(int value) {  
        number = number + 2;  
  
        System.out.println("2 Number: " + number);  
    }  
}
```

YES**NO***(2 marks)*

n) What output is produced by the following code?

```
int a = 6;  
int b = 5;  
int c = 7;  
  
System.out.print("CS101 is ");  
  
if ( !(a < b) || a > c ) {  
    System.out.println("fun.");  
} else {  
    System.out.println("great.");  
}
```

(2 marks)

SURNAME: FORENAMES:

o) What output is produced by the following code?

```
int a = 4;  
int b = 3;  
int c = 2;
```

```
b = c;  
c = a;  
a = c;
```

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

(2 marks)

p) Complete the output:

```
int c = 27 % 10;
```

```
int d = 9 / 2;
```

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

```
c:      d:
```

(2 marks)

SURNAME: FORENAMES:

q) Complete the output:

```
int a = (int) (4.6 + 1.2);  
int b = (int)4.6 + (int)0.7;  
System.out.println("a: " + a + " b: " + b);
```

a:	b:
----	----

(2 marks)

r) Consider the following code (notice the values assigned to variables a, b and c have been replaced with ???):

```
int a = ???;  
int b = ???;  
int c = ???;  
  
if (a < b && a < c) {  
    System.out.println("correct");  
}
```

Give one set of possible values that could be assigned to a, b and c so that the word "correct" is printed:

int a =
int b =
int c =

(2 marks)

SURNAME: FORENAMES:

- s) Complete the method header for the `getAge()` method (i.e. complete the first line of the method definition). The `getAge()` method is *called* in the following way:

```
int age = getAge("Emily");
```

```
private _____ getAge ( _____ ) {  
  
    System.out.print(name + ", Enter your age: ");  
    String age = Keyboard.readInput();  
    return Integer.parseInt(age);  
}
```

(2 marks)

- t) Complete the method header for the `printSum()` method (i.e. complete the first line of the method definition). The `printSum()` method is *called* in the following way:

```
printSum(24, 33);
```

```
private void printSum ( _____ ) {  
  
    int sum = num1 + num2;  
    System.out.println("Sum: " + sum);  
}
```

(2 marks)

SURNAME: FORENAMES:

Question 2 (5 marks)

What is the output of the following program?

```
public class IfExample {  
    public void start() {  
        testOuput(32);  
    }  
  
    private void testOuput(int number) {  
  
        boolean a = true;  
        boolean b = false;  
  
        if (a && number > 15) {  
  
            if (number < 40 || number == 100) {  
                System.out.println("line 1");  
                System.out.println("line 2");  
            } else {  
                System.out.println("line 3");  
                System.out.println("line 4");  
            }  
  
            if ( ! b ) {  
                System.out.println("line 5");  
            } else {  
                System.out.println("line 6");  
            }  
        } else {  
            System.out.println("line 7");  
        }  
  
        System.out.println("line 8");  
    }  
}
```

(5 marks)

CONTINUED

SURNAME: FORENAMES:

Question 3 (20 marks)

a) Write a Java statement which declares an `int` array. Use the identifier, `numbers`, for the array variable.

(2 marks)

b) Write a Java statement which constructs the `numbers` array (that you declared in part (a) above) to be large enough to store exactly 9 `ints`.

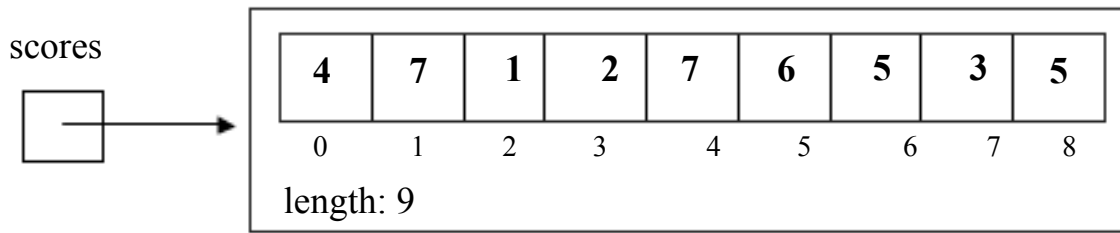
(2 marks)

c) Write a Java statement which stores the `int`, 4, in position 0 of the `numbers` array.

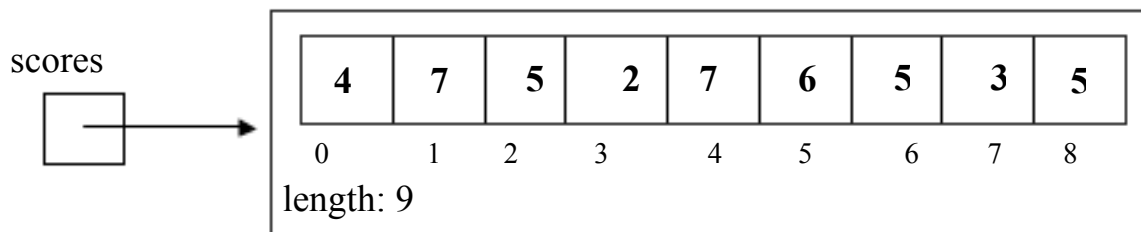
(2 marks)

SURNAME: FORENAMES:

For parts (d) to (g) below, assume that the `int` array, `scores`, has been created and contains the `int` values as shown in the diagram below.



d) Write a Java statement which assigns the value in position 6 of the `scores` array to the element in position 2 of the `scores` array. (After this statement is executed the `scores` array should contain the values shown in the diagram below.)



(2 marks)

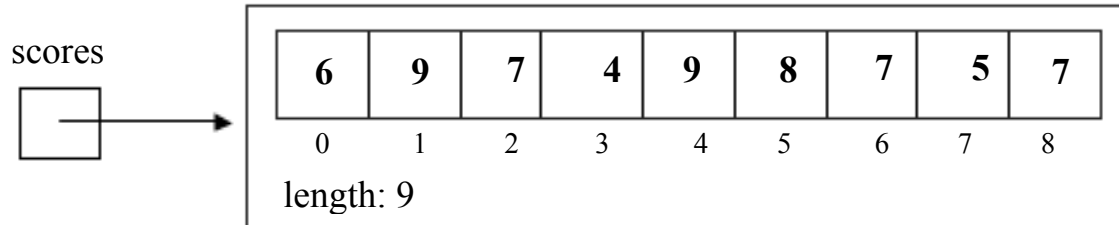
e) What is the output when the following Java statement is executed?

```
System.out.println("1. " + scores.length);
```

(2 marks)

SURNAME: FORENAMES:

f) Write a loop which adds 2 to each value of the `scores` array. (After the loop is executed the `scores` array should contain the values shown in the diagram below.)



(5 marks)

g) Add a Java loop to the code below. The loop should work out the sum of all the values in the `scores` array.

```
int sum = 0;
```

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

(5 marks)

CONTINUED

SURNAME: FORENAMES:

Question 4 (10 marks)

a) Convert the following while loop into a for loop:

```
int value;
String digits = "";

int pos = 3;
while (pos < 10) {
    value = (int) (Math.random() * 5);
    digits = digits + value;
    pos++;
}

System.out.println("Digits: " + digits);
```

```
int value;
String digits = "":

System.out.println("Digits: " + digits);
```

(5 marks)

SURNAME: FORENAMES:

b) Write a loop which prints six random digits. Each digit is a random number between 3 and 6 inclusive. For example, executing the completed code could (the digits are random) give the output:

436543

(5 marks)

CONTINUED

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Question 6 (5 marks)

What is the output of the following program?

```
public class MethodExample {  
    public void start() {  
        method3();  
    }  
  
    private void method3() {  
        System.out.println("Method 3");  
        method1();  
        method2();  
    }  
  
    private void method2() {  
        System.out.println("Method 2");  
        method1();  
    }  
  
    private void method1() {  
        System.out.println("Method 1");  
    }  
}
```

(5 marks)

SURNAME: FORENAMES:

Question 7 (10 marks)

Complete the definition of the `getCorrespondingGrade()` method. This method is passed an `int` parameter representing a mark out of 100 and, the method returns a `String` representing the corresponding grade. The grade ranges used for this method are:

- A (80-100),
- B (65-79),
- C (50-64),
- D (0-49).

For example, the following code:

```
String grade = getCorrespondingGrade(84);  
System.out.println("Your grade is: " + grade);
```

produces the output:

```
Your grade is A
```

```
private _____ getCorrespondingGrade ( _____ ) {
```

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}

(10 marks)

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OVERFLOW PAGE

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ROUGH WORKING (WILL NOT BE MARKED)

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

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