

THE UNIVERSITY OF AUCKLAND

SECOND SEMESTER, 2008

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:	

CONTINUED

SURNAME: FORENAMES:

CompSci 101 Test Results

Question	Marks	Out of
Question 1		20
Question 2		10
Question 3		15
Question 4		20
Question 5		20
Question 6		15
TOTAL		100

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Question 1 (20 marks)

What is displayed by each of the following pieces of Java program?

a) `System.out.println("\\\\//\\//");``\\//`

(2 marks)

b) `System.out.println(3 + Integer.parseInt("2") * 3);``9`

(2 marks)

c) `int value = 500;
// no calculator needed for this!
System.out.println((value / 456)*456 + (value % 456));``500`

(2 marks)

d) `int i = 2;
int[] numbers = {4, 2, -7, 5, 1, 6, 3};
System.out.println (numbers[i+1]);``5`

(2 marks)

e) `String name = "bmi";
System.out.println(name.toUpperCase());``BMI`

(2 marks)

f) `String name = "plectrum";
System.out.println(name.substring(0, 2)+ name.substring(6));``plum`

(2 marks)

g) `String word = "supercalifragilisticexpialidocious";
String remark = "amusing";
if (word.length()>20) {
 remark = "sesquipedalian";
}
System.out.println ("word is " + remark);``word is sesquipedalian`

(2 marks)

CONTINUED

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h) `int x = 5;`
`double y = 4.0;`
`System.out.println(Math.max(x, y)); // be careful!`

5.0

(2 marks)

i) `int[] numbers = {2,3,4,5,6,7,8};`
`System.out.println(numbers[4]/numbers[1]);`

2

(2 marks)

j) `String[] strings = {"panther","jaguar","ocelot","ounce"};`
`System.out.println(strings[3].length());`

5

(2 marks)

Question 2 (10 marks)

Add the return type to the following Java methods:

a)

```
private int calculateMinutes(double hours ) {  
    return (int)(hours * 60);  
}
```

(2 marks)

b)

```
private boolean isRepeated(String s) {  
    String firstPart = s.substring(0,s.length()/2);  
    return s.equals(firstPart+firstPart);  
}
```

(2 marks)

c)

```
private String getSurname (String name) {  
    int firstSpace = name.indexOf(' ');  
    return name.substring(firstSpace + 1);  
}
```

(2 marks)

CONTINUED

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d)

```
private double times2(int num) {  
    return num * 2.0;  
}
```

(2 marks)

e)

```
private void printWages(double payRate, int hours){  
    double wages = payRate * hours;  
    System.out.println("Wages: " + wages);  
}
```

(2 marks)

Question 3 (15 marks)

- a) Write a Java boolean expression which tests if the value of the double variable, `number`, is less than 50.0.

```
number < 50.0
```

(3 marks)

- b) Write a Java boolean expression which tests if the value of the double variables, `d1`, `d2`, both round down (truncate) to the same int value.

```
(int) d1 == (int) d2
```

(3 marks)

- c) Write a Java boolean expression which tests if there is a character '\$' in the String variable, `word`, at the position given by the int variable `i`

```
word.charAt(i) == '$'
```

(3 marks)

- d) Write a Java boolean expression which tests if the value of the String variable, `name`, has exactly the same characters in the same order as the value of the String variable, `alias`.

```
name.equals(alias)
```

(3 marks)

- e) Write a Java boolean expression which tests whether the value of the int variable, `number`, is equal to either 9 or 16.

```
(number == 9) || (number == 16)
```

(3 marks)

CONTINUED

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Question 4 (20 marks)

Complete each of the methods below as specified in the comment preceding each method.

a)

```
// method to find the maximum of four different numbers
private int maximum(int x1, int x2, int x3, int x4){

    return Math.max(Math.max(x1,x2),Math.max(x3,x4));

}
```

(4 marks)

b)

```
// method to decide whether three numbers are in ascending
// order
private boolean areInOrder(int n1, int n2, int n3){

    return (n1 <= n2) && (n2 <= n3);

}
```

(4 marks)

c)

```
// method to return the first half of a String
//(assuming that the length of the String is even)
private String firstHalf(String s){

    int middle = s.length() / 2;
    return s.substring(0,middle);

}
```

(4 marks)

d)

```
// method to tell whether two Strings, name1, and name2,
// are exactly the same. The method returns the String
// "yes" if they are the same, but "no" otherwise
private String theSame(String name1, String name2){

    String answer = "no";
    if (name1.equals(name2)) {
        answer = "yes";
    }
    return answer;

}
```

(4 marks)

CONTINUED

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e)

```
// method to "print" a line of '*'s, the number of '*'s
// in the line being given by int parameter, n. There
// should be no newline at the end of line.
private void starLine(int n){

    for (int i=0; i<n; i++){
        System.out.print('*');
    }

}
```

(4 marks)

Question 5 (20 marks)

a) Complete the method `areCloseEnough()` which accepts three double parameters, `d1`, `d2` and `delta` (a small positive number, e.g. 0.0000001). The method returns `true` when the difference between `d1` and `d2` is less than the value of `delta`, but returns `false` otherwise. (Note that `d1` might be greater than or less than `d2` – the `Math.abs()` method might be useful.)

```
// method to find whether two numbers are close to equal
private boolean areCloseEnough
    (double d1, double d2, double delta) {

    return Math.abs(d1-d2)<delta;

}
```

(5 marks)

b) Complete the method `displaySolutions()`. The method has three double parameters, `a`, `b` and `c`. The method finds the two solutions to the quadratic equation ax^2+bx+c as the variables `solution1` and `solution2`, then displays the solutions. The solutions have the values $(-b + \sqrt{(b^2-4*a*c)})/2$ and $(-b - \sqrt{(b^2-4*a*c)})/2$. You may assume that both solutions exist. Hint: `Math.sqrt()` should be useful.

```
// method to display both solutions to a quadratic equation
private void displaySolutions(double a, double b, double c) {
    double root = Math.sqrt(b*b-4*a*c);
    double solution1 = (-b+root)/2;
    double solution2 = (-b-root)/2;

    System.out.print("The solutions are: ");
    System.out.println(solution1 + ", " + solution2);
}
```

(5 marks)

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c) Complete the method `rotateRight()` which accepts a `String` parameter `word`, and returns the `String` rotated one character to the right, e.g. "luck" gives the result "kluc"

```
// method to find a word rotated one character to the right,  
// e.g. "luck" gives result "kluc"  
  
private String rotateRight (String word){  
    int lastPosition = word.length()-1;  
    char lastChar = word.charAt(lastPosition);  
    String wordFront = word.substring(0,lastPosition);  
    return lastChar + wordFront;  
  
}
```

(5 marks)

d) Complete the method `isAllDigits()` which accepts a `String` parameter, `word`, and returns `true` if every character in `word` is a digit (0, 1, 2, 3, 4, 5, 6, 7, 8, or 9), and `false` otherwise. You may use the boolean method `Character.isDigit(char c)` that returns `true` if its parameter `c` is a digit and `false` otherwise.

```
// method to see if a word is all digits  
  
private boolean isAllDigits(String word) {  
    boolean allSoFar = true; // all characters so  
                             // far tested are digits  
    for (int i = 0; i < word.length(); i++) {  
        if ( Character.isDigit(word.charAt(i)) ) {  
            allSoFar = false;  
        }  
    }  
    return allSoFar;  
  
}
```

(5 marks)

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Question 6 (15 marks)

a) What is the output when the following start () method is executed?

```
// mystery program
public void start() {
    String s1 = "****";
    String s2 = "*  *";
    System.out.println(s1);
    for (int i = 0; i<(s1.length()/2; i++) {
        System.out.println(s2);
    }
    System.out.println(s1);
    for (int i = 0; i<(s1.length()/2; i++) {
        System.out.println(s2);
    }
    System.out.println(s1);
}
```

Show the output here:

```
****
*  *
*  *
****
*  *
*  *
****
```

(8 marks)

b) What is the output when the following start () method is executed?

```
// owls in the summer
public void start() {
    String s = "toohot";
    System.out.println(s + " " + munted(s));
}

// mystery helper method
private String munted(String s) {
    String result = "";
    for (int j=s.length()-1; j>=0; j--) {
        result = result + s.charAt(j);
    }
    return result;
}
```

Show the output here:

```
toohot toohot
```

(7 marks)

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ROUGH WORKING (WILL NOT BE MARKED)

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