

Family Name:

Other Names:

ID Number:

COMP102: Test 1

14 March, 2008

Model Solutions

Instructions

- Time allowed: **45 minutes** .
- Answer **all** the questions. There are 45 marks in total.
- Write your answers in the boxes in this test paper and hand in all sheets.
- If you think some question is unclear, ask for clarification.
- The last page contains some Java documentation and model solutions for part of Assig 2.
- This test will contribute 4% of your final grade, but only if it helps your grade.
- Paper translation dictionaries and calculators without a full set of alphabet keys are permitted.

Questions

Marks

1. Basic Java	[9]	<input type="text"/>
2. Understanding variables	[5]	<input type="text"/>
3. Defining a Method	[10]	<input type="text"/>
4. Using a Scanner and println	[14]	<input type="text"/>
5. Loops and Conditionals	[7]	<input type="text"/>
	TOTAL:	<input type="text"/>

Please answer the following question. (Your answer will not affect your mark in any way.)

How much programming had you done before starting the course?

Little or none

Some (used variables, if's, and loops)

Lots (used arrays, defined methods/functions with parameters, used libraries)

SPARE PAGE FOR EXTRA ANSWERS

Cross out rough working that you do not want marked.
Specify the question number for work that you do want marked.

ANSWERS

Question 1. Basic Java

[9 marks]

For each of the following ten terms, find a corresponding element of the program below, and draw a labelled circle around the element. The first one is done as an example.

1. Class name
2. A string: "area: ", "Wall needs ", " litres", "George Bush", "Entry"
3. A variable: `sc`, `area`, `paint`, `name`
4. An expression with an operator: `area/5.4`, "Wall needs " + `paint` + " litres"
5. A comment: `/** Computes the amount of paint for a wall */`
`// 5.4 square meters per litre`
6. The name of a method: `computeSize`, `print`, `nextDouble`, `println`, `checkName`, `equals`
7. The name of a type: `Scanner`, `double`, `String`
8. An assignment statement: Any of the three lines with an =
9. A method call: `System.out.print("area: ");`
`sc.nextDouble();`
`System.out.println("Wall needs " + paint + " litres");`
`name.equals("George Bush");`
`System.out.print("Entry Denied");`
10. A parameter declaration: `String name`

```

public class Question1 {
    /** Computes the amount of paint for a wall */
    public void computeSize(){
        System.out.print("area: ");
        Scanner sc = new Scanner(System.in);
        double area = sc.nextDouble();
        double paint = area / 5.4 ;    // 5.4 square meters per litre
        System.out.println("Wall needs " + paint + " litres");
    }
    public void checkName(String name){
        if ( name.equals("George Bush") ) {
            System.out.print("Entry Denied");
        }
    }
}

```

ANSWERS

Question 2. Understanding variables

[5 marks]

Suppose the following `assignToVars` method is called with an argument of 8, (eg, you call the method using BlueJ and enter 8 in the dialog box asking for the value of `n`). What will it print out?

```
public void assignToVars(int n){
    System.out.println("assignToVars(" + n + ") :");

    int a = n + 4;
    int b = n + a;
    System.out.println("a is: " + a);
    System.out.println("b is: " + b);

    a = a - 5;
    b = a * 2;
    b = b - 1;

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

    System.out.printf("was %d, now %d, will be \n", a-b, n);
}
```

```
assignToVars(8) :
a is: 12
b is: 20
a is now: 7
b is now: 13
was -6, now 8, will be
```

ANSWERS

Question 3. Defining a Method

[10 marks]

(a) [7 marks] Suppose we need to organise the students in a course into teams for a programming competition. Two students must be the manager and deputy manager for the competition (and therefore can't be in a team), and each team has to have exactly 5 members. Complete the following `computeTeams` method so that it prints out the number of programming teams that can be made for a given number of students. The method has one parameter — an integer specifying the number of students in the course.

The method should print out the result in a form such as:

"A course with 50 students can have 9 teams".

or

"A course with 12 students can have 2 teams".

(where the actual numbers depend on the argument value passed to the method.)

```
public void computeTeams(int numStudents){
    int teams = (numStudents - 2) / 5 ;

    if (numStudents >= 100){           // part b
        teams = (numStudents - 3) / 5; // part b
    }

    System.out.printf("A course with %d students can have %d teams\n",
                      numStudents, teams);

}
```

(b) [3 marks] Modify your program above so that it also handles the additional requirement that if the class has 100 students or more, there has to be an assistant manager also, who cannot be a member of a team.

[Put your answer to (b) in the box above, or use the spare pages (p2 or p10)]

ANSWERS

Question 4. Using a Scanner and println

[14 marks]

(a) [6 marks] Consider the following method which will prompt the user for some values and print something out.

Hint: draw boxes for each variable and write its value.

```
public void describeCourse(){
    Scanner scan = new Scanner(System.in);
    System.out.print("Enter discipline, code, points: ");
    String d = scan.next();
    int c = scan.nextInt();
    int p = scan.nextInt();

    System.out.print("Name of course: ");
    String m = scan.next();
    String n = scan.nextLine();

    System.out.println("Course = " + d + c);
    System.out.println("Name = " + n);

    String description = n + m;

    System.out.println("Line1 = " + description);
    System.out.println("Line2 = " + c + p);
    System.out.println("Line3 = " + (c + p));
}
```

What will the method print out if the user typed the following answers in response to the prompts:

Enter discipline, code, points: COMP 303 15

Name of course: Analysis of Algorithms

```
Course = COMP303
Name = of Algorithms
Line1 = of AlgorithmsAnalysis
Line2 = 30315
Line3 = 318
```

(Question 4 continued on next page)

(Question 4 continued)

ANSWERS

(b) [8 marks] Complete the following method to print out a library overdue notice. The method should first ask the user to enter the title of the book, then the number of days overdue. It should then print out a notice like the one shown below. It should use a `Scanner` to read the title, name, and days overdue from the user.

For example, if the user typed `Gulliver's Travels` for the title, and `18` for the number of days, the output should look something like:

```
Your copy of Gulliver's Travels
is now 18 days overdue.
Please return it now.
```

```
public void overdueNotice(){

    Scanner scan = new Scanner(System.in);

    System.out.print("Enter title: ");
    String title = scan.nextLine();
    System.out.print("Enter days overdue: ");
    int days = scan.nextInt();

    System.out.println("  Your copy of " + title);
    System.out.println("  is now " + days + " days overdue.");
    System.out.println("  Please return it now.");

}
```

ANSWERS

Question 5. Loops and Conditionals (harder)

[7 marks]

(a) [5 marks] What will the following method print out if it is called with the arguments 14 and 6?

```
public void compute(int a, int b){
    System.out.printf("compute(%d, %d)\n", a, b);
    int x = a;
    int y = b;
    int ans = 0;
    while ( (x > 0) && (y > 0) ){
        System.out.println(x + ", " + y);
        ans = ans + 1;
        if (x >= y){
            x = x-y;
            y = y-1;
        }
        else {
            int temp = x;
            x = y;
            y = temp;
        }
    }
    System.out.println("ans = " + ans);
}
```

```
compute(14, 6)
| 14, 6
| 8, 5
| 3, 4
| 4, 3
| 1, 2
| 2, 1
| ans = 8
```

(Question 5 continued on next page)

(Question 5 continued)

(b) [2 marks] Explain why the compute method is always guaranteed to stop, whatever its input.

| If either argument is negative, it will not enter the loop at all
| If both arguments are positive, then there are two possibilities every time
| round the loop:
| If x is smaller than y, then the values of x and y are swapped
| (so the next time, x is not smaller than y)
| If x is not smaller than y, then x is made smaller (since y is positive) and
| y will be made smaller.
| So at least once every two steps, both x and y will get smaller.
| One of them must reach 0 eventually, at which point the loop will exit.
