

Name:

ID Number:

COMP102: Test 1

Model Solutions

16 Mar, 2007

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.
- There is some Java documentation at the end of the test paper.
- Model solutions for part of Assignment 2 are also included at the end of the test paper.
- This test will contribute 5% of your final grade, but only if it helps your grade.
- Non-electronic translation dictionaries and calculators without a full set of alphabet keys are permitted.

Questions

Marks

1. Basic Java	[8]	<input type="text"/>
2. Understanding variables	[5]	<input type="text"/>
3. Defining a Method	[10]	<input type="text"/>
4. Using a Scanner and println	[15]	<input type="text"/>
5. Loops and Conditionals	[7]	<input type="text"/>
	TOTAL:	<input type="text"/>

Question 1. Basic Java

[8 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. Method header
3. Assignment statement
4. Method call
5. Parameter declaration
6. Variable declaration
7. Name of a type
8. An expression
9. A call to a constructor
10. A String

```
public class Question1{
    public void translate(){
        Scanner scan = new Scanner(System.in);
        System.out.print("word: ");
        String word = scan.next();
        System.out.println("I don't understand "+ word);
    }
    public void expand(int n){
        double larger = (n * n * n) + 100;
        System.out.printf("%.2f expanded is %.2f\n", n, larger);
    }
}
```

Answers: (there are several possible options for most of the terms)

public void translate(){	// 2. <i>method header</i>
public void expand(int n){	// 2. <i>method header</i>
Scanner scan = new Scanner(System.in);	// 3. <i>Assignment statement</i>
String word = scan.next();	// 3. <i>Assignment statement</i>
double larger = (n * n * n) + 100;	// 3. <i>Assignment statement</i>
System.out.print("word: ");	// 4. <i>Method call</i>
System.out.println("I don't understand "+ word);	// 4. <i>Method call</i>
System.out.printf("%.2f expanded is %.2f\n", n, larger);	// 4. <i>Method call</i>
(int n)	// 5. <i>Parameter declaration</i>
Scanner scan or String word or double larger	// 6. <i>Variable declaration</i>
Scanner, String, int, double	// 7. <i>Name of a type</i>
(n * n * n) + 100,	// 8. <i>expression (and all subexpressions of</i>
"word: ", and all other strings,	// 8. <i>expression</i>
new Scanner(System.in), scan.next(), n, larger	// 8. <i>are also expressions</i>
new Scanner(System.in)	// 9. <i>A call to a constructor</i>
"word: " or "I don't understand ",	// 10. <i>String</i>
"%.2f expanded is %.2f\n"	// 10. <i>String</i>

Question 2. Understanding variables

[5 marks]

Suppose the following `calculate` method is called with an argument of 20, (eg, you call the method using BlueJ and enter 20 in the dialog box asking for the value of `num`). What will it print out?

```
public void calculate( int num){
    int first = num;
    int second = first + num;

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

    first = first / 7;
    num = num + 1;
    second = second + num;

    System.out.println("num is now "+ num);
    System.out.printf("a: %d b: %d\n", first, second);
}
```

```
num is now: | 20
| a: 20 b: 40
| num is now 21
| a: 2 b: 61
```

Question 3. Defining a Method

[10 marks]

Complete the following `computeBuses` method so that it prints out the number of minibuses a school needs to take some of its sports teams to the regional competition. The method should have one parameter — an integer specifying the number of teams the school is going to take.

Each team has 11 players and one coach. The school also needs to have an extra adult helper for each minibus. A minibus can take 18 passengers.

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

```
For 8 teams, you need 6 minibuses
```

```
public void computeBuses(    int numTeams){
    int people = numTeams * 12;
    int availableSeats = 18-1;
    int numBuses = (people - 1)/availableSeats + 1;
    System.out.printf("For %d teams, you need %d buses\n",
                      numTeams, numBuses);
}
```

Question 4. Using a Scanner and println

[15 marks]

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

```
public void doit(){
    Scanner scan = new Scanner(System.in);
    System.out.print("Enter name, phone, address: ");
    String m = scan.next();
    String n = scan.next();
    String n = n + m;

    System.out.println("answer1 = " + n);

    int p = scan.nextInt();
    int q = scan.nextInt();
    int r = scan.nextInt();
    System.out.println("answer2 = " + p + q + r);
    System.out.println("answer3 = " + (p + q + r));

    int s = scan.nextInt();
    String t = scan.nextLine();

    System.out.println("number " + t + " on " + s + "Street");
}
```

What will the method print out if the user typed the following lines in response to the prompt:

```
Lindsay Smith
020 123 2004
28 Short St
```

```
answer1 = SmithLindsay
answer2 = 0201232004
answer3 = 2147
number Short St on 28Street
```

()

(Question 4 continued on next page)

(Question 4 continued)

(b) [9 marks] Complete the following `printGreeting` method so that it first asks the user to enter a number and then asks the user to enter a name, and then prints out a birthday card greeting like one shown below. It should use a `Scanner` to read the number and name from the user.

If the user typed the number 19 and the name "Jean", the output should look something like:

```
Dear Jean
  Happy 19th birthday!
  Many happy returns.
```

```
public void printGreeting(){
    Scanner scan = new Scanner(System.in);
    System.out.print("Enter number: ");
    int age = scan.nextInt();
    System.out.print("Enter name: ");
    String name = scan.nextLine();
    System.out.println(" Dear " + name + ", ");
    System.out.println("    Happy " + age + "th birthday!");
    System.out.println("    Many happy returns!");
}
```

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 28 and 20?

```
public void doNums(int m, int n){
    System.out.printf("doNums (%d, %d) ", m, n);
    int x = m;
    int y = n;
    while (x > 0){
        System.out.println(x + " : " + y);
        if (y > x) {
            int t = x;
            x = y;
            y = t;
        }
        else {
            x = x - y;
        }
    }
    System.out.println("ans is " + y);
}
```

```
doNums (28, 20)
28 : 20
8 : 20
20 : 8
12 : 8
4 : 8
8 : 4
4 : 4
ans is 4
```

(b) [2 marks] Explain what the doNums method computes and how.

The method computes the greatest common factor of the two numbers. It uses Euclid's Algorithm (one of the oldest known algorithms), which repeatedly subtracts the smaller number from the larger until the smaller number is zero. It depends on the fact that the greatest common factor of two numbers is also the greatest common factor of the larger number and the difference of the two numbers.
