

Family Name:

Other Names:

ID Number:

COMP102: Test 1

27 March, 2009

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.
- Brief Java documentation is at the end; you may tear it off.
- This test will contribute 15% of your final grade
(But we will use your exam mark if it is higher.)
- You may use paper translation dictionaries, and calculators without a full set of alphabet keys.

Questions

Marks

1. Basic Java	[5]	<input type="text"/>
2. Understanding variables	[6]	<input type="text"/>
3. Defining a Method	[10]	<input type="text"/>
4. Understanding Scanner and System.out	[9]	<input type="text"/>
5. Programming with Scanner and System.out	[8]	<input type="text"/>
6. Methods calling methods	[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

[5 marks]

Consider the method definition below.

```
public double calculateCost(int length){
    int numberComponents = length /25;
    if (length == 200 ) {
        numberComponents = numberComponents + 1;
    }
    double price = 54.70 + numberComponents * 18.36;
    return price;
}
```

(a) [1 mark] What is the name of the method being defined?

calculateCost

(b) [1 mark] How many parameters does the method have?

One

(c) [1 mark] What is the name of the variable of type *double*?

price

(d) [1 mark] How many assignment statements are in the method?

three

(e) [1 mark] What is the type of the value returned by the method?

double

ANSWERS

Question 2. Understanding variables

[6 marks]

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

Hint: draw a box for each variable and keep track of the value that is put into it.

```
public void printStuffOut(String ans){
    System.out.println("printStuffOut (" + ans + ") :");

    String first = "Maybe";
    String third = ans + "No";

    System.out.println("first is: " + first);
    System.out.println("third is: " + third);

    String second = ans + first;
    System.out.println("all: " + first + second + third);

    first = third;
    third = first + second;
    System.out.println("1st: " + first);
    System.out.println("2nd: " + second);
    System.out.println("3rd: " + third);
}
```

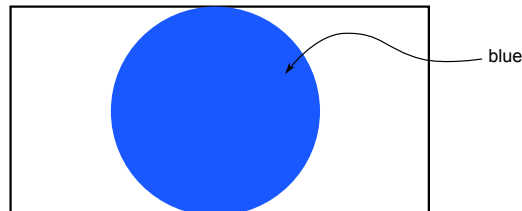
```
printStuffOut(Yes) :
| first is:  Maybe
| third is:  YesNo
| all:  MaybeYesNoYesMaybe
| 1st:  YesNo
| 2nd:  YesMaybe
| 3rd:  YesNoYesMaybe
```

ANSWERS

Question 3. Defining a Method

[10 marks]

The flag for a student organisation consists of a white rectangle (with a black border) and a solid blue circle, as shown below. The width of the flag should be two times its height, and the solid blue circle should be in the center.



(a) [7 marks] Complete the drawFlag method below so that it draws the flag on a DrawingCanvas. The method has two parameters: the height of the flag and the DrawingCanvas to draw on. The left top corner of the flag should be at (10,10).

You will need to use the drawRect, fillOval, and setColor methods, described in the java documentation.

(b) [3 marks] Modify your program so that if the height of the flag is greater than 100, it will draw the outside rectangle double thickness. (Add your answer to the box below)

```
public void drawFlag(int height, DrawingCanvas canvas){

    int width = height * 2;
    canvas.drawRect(10, 10, width, height);

    if (height > 100) {
        canvas.drawRect(11, 11, width-2, height -2); // part b only
    } // part b only
    canvas.setColor(Color.blue);

    int leftCircle = 10+(height/2);
    canvas.fillOval ( leftCircle , 10, height, height);

}
```

ANSWERS

Question 4. Understanding Scanner and System.out

[9 marks]

Consider the following printLabels method which will prompt the user for some values and print something out.

Hint: draw boxes for each variable and keep track of the value put in it.

```
public void printLabels(){
    Scanner scan = new Scanner(System.in);
    System.out.print("Enter post code and city: ");
    int code = scan.nextInt();
    String city = scan.next();

    System.out.print("Street address (# and street): ");
    int num = scan.nextInt();
    String st = scan.nextLine();

    System.out.println("Courier:");
    System.out.println(st + num);
    System.out.println(city + " NZ");

    System.out.println("Postie:");
    System.out.println(code + num + st);
    System.out.println("City = " + city);
}
```

(a) [6 marks] What will the method print out if the user typed the following answers to the two prompts:

```
Enter post code and city: 6014 Wellington
Street address ( and street): 23 Hawthorne Road
Courier:
Hawthorne Road23
Wellington NZ
Postie:
6037 Hawthorne Road
City = Wellington
```

(Question 4 continued on next page)

(Question 4 continued)

ANSWERS

(b) [3 marks] Explain why the `printLabels` method will fail (throwing an exception) if the user typed the following answers in response to the prompts:

Enter post code and city: 6214 Lower Hutt

Street address: 48 Rose Ave

Because it would scan the integer 6214 into `code`, then "Lower" into `city`, and it would then try to scan an integer, but the next thing in the buffer would be "Hutt", which is not an integer, so it would crash.

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 5. Programming with Scanner and System.out

[8 marks]

Complete the following `PrintInvoice` method to print out an invoice for an order of phone cleaning cloths. The method should first ask the user to enter the name of the purchaser, then ask for the number of cloths ordered. It should then compute the total price (at \$15 per cloth), and print out an invoice notice like the one shown below. It should use a `Scanner` to read the name and number of cloths from the user.

For example, if the user typed `Lindsay Smith` for the name, and `20` for the number of cloths, the output should look something like:

```
Invoice
To: Lindsay Smith
Order of 20 cloths at $15 each:      Total: $300.
Please pay on invoice.
```

```
public void printInvoice (){
    Scanner scan = new Scanner(System.in);

    System.out.print("Enter name: ");
    String name = scan.nextLine();
    System.out.print("Enter number of cloths: ");
    int cloths = scan.nextInt();

    int total = cloths * 15;

    System.out.println("Invoice");
    System.out.println("  To: " + name);
    System.out.print("  Order of "+cloths+ " cloths at $15 each:");
    System.out.println("    Total: $" + total);
    System.out.println("Please pay on invoice.");

}
```

ANSWERS

Question 6. Methods calling Methods

[7 marks]

Consider the following `sillyGame` method which lets two players play a “game” where they take turns drawing red and blue squares on a window. The body of the **while** loop contains (almost) the same set of statements twice (marked by the vertical lines below).

It would be better design to make another method called `takeTurn` which asked a player for a size and drew a square of the appropriate colour at a random position on the window, and make `sillyGame` call `takeTurn` twice, as in the version of `sillyGame` on the facing page.

Complete the definitions of `sillyGame` and `takeTurn` on the facing page. You will need to determine the appropriate arguments for the calls to `takeTurn`, the appropriate parameters in the definition of `takeTurn`, and the statements in `takeTurn`.

```
public void sillyGame(){
    JFrame frame = new JFrame("dum");
    DrawingCanvas canvas = new DrawingCanvas();
    frame.setSize(600, 400);
    frame.getContentPane().add(canvas, BorderLayout.CENTER);
    frame.setVisible(true);
    Scanner scan = new Scanner(System.in);

    int round = 1;
    while (round <= 10){

        System.out.print("Player 1 - enter size: ");
        int size = scan.nextInt();
        int x = (int) (400 * Math.random());
        int y = (int) (300 * Math.random());
        canvas.setColor(Color.red);
        canvas.fillRect(x, y, size, size);

        System.out.print("Player 2 - enter size: ");
        size = scan.nextInt();
        x = (int) (400 * Math.random());
        y = (int) (300 * Math.random());
        canvas.setColor(Color.blue);
        canvas.fillRect(x, y, size, size);

        System.out.println("End of round "+round);
        round = round + 1;
    }
    System.out.println("All done");
}
```

(Question 6 continued on next page)

(Question 6 continued)

```

public void sillyGame(){
    JFrame frame = new JFrame("dum");
    DrawingCanvas canvas = new DrawingCanvas();
    frame.setSize(600, 400);
    frame.getContentPane().add(canvas, BorderLayout.CENTER);
    frame.setVisible(true);
    Scanner scan = new Scanner(System.in);

    int round = 1;
    while (round <= 10){

        this.takeTurn( "Player 1", Color.red, scan, canvas);

        this.takeTurn( "Player 2", Color.blue, scan, canvas);

        System.out.println("End of round "+round);
        round = round + 1;
    }
    System.out.println("All done");
}

public void takeTurn( String player, Color col, Scanner sc, DrawingCanvas can){
    System.out.print(player + "- enter size:");
    int size = sc.nextInt ();
    int x = (int) (400 * Math.random());
    int y = (int) (300 * Math.random());
    can.setColor(col);
    can.fillRect (x, y, size, size);

}

```

SPARE PAGE FOR EXTRA ANSWERS

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