

Family Name:
Other Names:

ID Number:
Signature

COMP102: Test 1

8 Aug, 2013

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 provided with the test
- This test contributes 15% of your final grade
(But your mark will be boosted up to your exam mark if that is higher.)
- You may use paper translation dictionaries, and calculators without a full set of alphabet keys.
- You may write notes and working on this paper, but make sure your answers are clear.

Questions

Marks

1. Components of Java Programs	[8]	<input type="text"/>
2. Understanding programs with variables	[8]	<input type="text"/>
3. Defining a Method	[8]	<input type="text"/>
4. Methods, Arguments, and Parameters	[6]	<input type="text"/>
5. Using Objects	[8]	<input type="text"/>
6. Defining and Calling Methods	[7]	<input type="text"/>
	TOTAL:	<input type="text"/>

Question 1. Components of Java Programs

[8 marks]

The questions on the facing page refer to the code below.

```
1 import comp102.*;
2 public class Question1{
3
4     public static final String message= "welcome to COMP102!";
5
6     public void showMessage(){
7         String name = UI.askString("Enter your name: ");
8         String msg = this.getMessage(name);
9         this.drawMessage(100, 100, msg);
10    }
11
12    public String getMessage(String n){
13        return n + ", " + message;
14    }
15
16    public void drawMessage(double x, double y, String lab){
17        double right = x+200;
18        UI.drawLine(x, y, right, y);
19        UI.drawLine(x, y+2, right, y+2);
20        UI.drawString(lab, x+10, y-2);
21    }
22
23 }
```

(Question 1 continued)

The following questions refer to the code on the facing page:

(a) [1 mark] Write the name of the class.

(b) [1 mark] List the names of the methods.

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

(d) [1 mark] List the local variables that have the `String` type.

(e) [1 mark] How many arguments does the `drawMessage` method require?

(f) [1 mark] List the names of all the parameters declared in the program?

(g) [1 mark] List the lines that contain a call to a method?

(h) [1 mark] List the arguments in line 9.

Question 2. Understanding programs with variables

[8 marks]

Consider the process method below. In the box on the facing page (p5), write the output that process would produce. Note that the first part of each line of output is provided for you.

Hint: Keep track of the value of each variable in the boxes.

```
public void process(){
    int level = 1;

    int first = 10;
    int second = 20;
    int third = 30;
    UI.println ("level is " + level);
    UI.println ("one is " + first );
    UI.println ("two is " + second);
    UI.println ("three is " + third);
    UI.println ("-----");

    level = level + 1;
    first = second;
    second = third;

    UI.println ("level is " + level);
    UI.println ("one is " + first );
    UI.println ("two is " + second);
    UI.println ("three is " + third);
    UI.println ("-----");

    level = level + 1;
    first = first + second;
    second = third + second;
    third = third + second;

    UI.println ("level is " + level);
    UI.println ("one is " + first );
    UI.println ("two is " + second);
    UI.println ("three is " + third);
}
```

level:

first:

second:

third:

(Question 2 continued)

level is

one is

two is

three is

level is

one is

two is

three is

level is

one is

two is

three is

Question 3. Defining a Method

[8 marks]

Complete the following drawTarget() method for drawing a target logo shown below.



The method should

- ask the user for the x position of the center of the logo.
- ask the user for the y position of the center of the logo.
- ask the user for the size of the logo, which is the diameter of the biggest circle.
- work out the coordinates and dimensions. The ratio of the diameters of the three circles is 3:2:1.
- draw the logo using the right color: red, white and then red.

```
public void drawTarget(){
```

```
}
```

Question 4. Methods, Arguments, and Parameters

[6 marks]

What will the following testNumbers method print in the text pane?

Note that testNumbers calls printNumbers which also prints some numbers.

```
public void TestNumbers(){  
    int z = this.printNumbers(6, 1);  
    UI.println (z);  
    UI.println ("-----");  
    int x = 2;  
    int y = 10;  
    z = this.printNumbers(x, y);  
    UI.println (z);  
    UI.println ("-----");  
    z = this.printNumbers(y, x);  
    UI.println (z);  
}
```

```
public int printNumbers(int s, int t){  
    s = s * 2;  
    UI.println (s + ", " + t);  
    return s + t;  
}
```

Question 5. Using objects

[8 marks]

Suppose the Tutor class has one constructor and two methods:

Constructor:

```
public Tutor(String name, int id, String note)
// constructs a Tutor object , with the specified name, id and a note.
//The note can be anything, but typically it is used to specify the
//student category , e.g. PhD, Master or undergraduate.
```

Methods:

```
public void addHours(int hour, String job)
// adds the working hours to the student's total working hours,
//and records the kind of job he did , e.g. lab , marking or tutorial .

public void printPayslip ()
// works out the total amount that needs to be paid and prints out the
// details of the tutor , the total hours, the jobs and the total payment.
```

Complete the following tutorPayment method, which should first create two Tutor objects, the first object for Alex Smith, whose ID is 12345 and he is a PhD student, and the second object for Bob Allen, whose ID is 67890 and he is an undergraduate student.

The method should then add the following hours for Alex and Bob.

```
1st object(Alex): 3 hours for marking
2nd object (Bob): 5 hours for labs
1st object(Alex): 10 hours for labs
1st object(Alex): 2 hours for tutorial
```

Finally, the method should print the payslip for both of them, first for Alex and then for Bob.

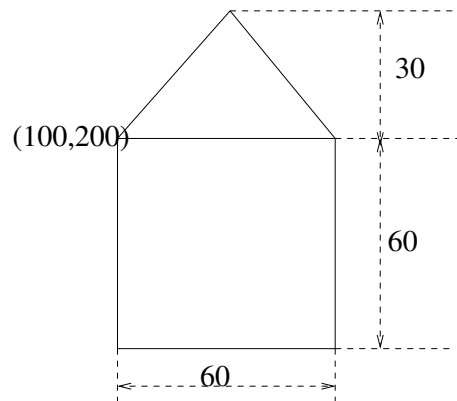
Please note: you must use the Tutor class and call the two methods in the Tutor class to do this.

Question 6. Defining and Calling Methods

[7 marks]

The following drawHouse1 method draws a house using a square and two lines.

```
public void drawHouse1(){  
    UI.drawRect(100, 200, 60, 60);  
    UI.drawLine(100, 200, 130, 170);  
    UI.drawLine(160, 200, 130, 170);  
}
```



The drawHouse1 method can only draw a house at a certain place in a fixed size because it uses many literal values. It would be better to define this method with parameters, so it can be called by other methods to draw houses at different places and in different sizes.

Define a new method drawHouse2 by modifying this method, so it uses parameters to specify the location and size. It should still draw a house using a square and two lines, and the height of the roof (triangle) should be half of the width of the house (the square).

```
public void drawHouse2( ) {
```

```
}
```

Write a test method that called the `drawHouse2` method three times to draw three different houses. You will need to work out the arguments yourself, and any reasonable location and size are acceptable as long as the houses do not overlap.

```
public void testDrawHouses(){
```

```
}
```

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.