

Family Name: ..... Other Names: .....

Student ID: ..... Signature .....

# COMP 102: Test 1

14 August, 2017

## Instructions

- Time allowed: **50 minutes**
- Answer **all** the questions. There are 40 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.
- 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. Understanding programs	[12]	<input type="text"/>
2. Writing programs with input, output and <b>if</b>	[18]	<input type="text"/>
3. Writing methods that use objects	[10]	<input type="text"/>
	TOTAL:	<input type="text"/>

**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.

1. Understanding programs

(12 marks)

(a) (6 marks) Understanding Java Syntax

The following checkTheFlag method contains two syntax errors. Circle them and show how you would correct them. What will be the output of this method after correction if the value of the parameter is false.

```
public void checkTheFlag(boolean flagged)
{
    if ( !flag ){
        UI.println ("Ready....");
    }
    else {
        UI.println("Go, Go, Go...");
    }
}
```

flag is undeclared variable so either change it to flagged to change flagged to flag  
Missing the double quotes in UI.println("Ready....");  
After correction, the program should print: Ready....  
on a separate line

- (b) (4 marks) Understanding variables  
What will the following method print out?

```
public void printThis ()
{
    int x = 4;
    String s = "David";
    x = x + 1;
    int y = (x / 2);
    Ul. println ("value1 = " + y);
    Ul. println ("value2 = " + "x");
    Ul. println ("value3 = " + (s+y));
}
```

**Hint:** write the values of the variables in the boxes

x:

y:

s:

```
value1 = 2
value2 = x
value3 = David2
```

- (c) (2 marks) Understanding variables and formatted prints  
What will the following method print out if x = 5 and y = 2?

```
public void computeValue(int x, int y)
{
    double value = (x+y)/ 2.0;
    Ul. printf ("The value = %.2f \n", value);
}
}
```

```
The value = 3.50
```

**SPARE PAGE FOR EXTRA ANSWERS**

Cross out rough working that you do not want marked.  
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2. Writing programs with input, output and if (18 marks)

Body Mass Index measures the body fat based on weight and height. Complete the following `doCalculateBMI()` and `calculateBMI(double height, double weight, int age)` methods to calculate the BMI of an adult and determine its category. If the age of the person is under 10, `calculateBMI` should print "Too young". Otherwise, it should print the BMI category.

For the `doCalculateBMI` method, you need to:

1. Ask the user to input age, weight and height
2. Call the `calculateBMI` passing the arguments (i.e. the input from the user in the previous point)

For the `calculateBMI` method, you need to do the following:

1. Depending on the age, either print "Too young", or print the BMI category based on the computed BMI value (see Table 1 below).

Your BMI is your weight (in kilograms) over your height squared (in meters). For example, given a weight of 90Kg and a height of 1.8m, then

$$BMI = 90/1.8^2 = 27.78kg/m^2$$

The categories are as follows:

Table 1: BMI Categories

Category	BMI range
Below normal	less than 18.5
Normal	18.5 to less than 25
Above normal	greater than or equal to 25

```
/**
 * Input weight (w), height (h) and age from the user.
 * call the calculateBMI method with those input values.
 */
public void doCalculateBMI()
{

}

public void calculateBMI(double height, double weight, int age)
{
```

```
}
```

```

public void doCalculateBMI()
{
    double w = UI.askDouble("Weight?");
    double h = UI.askDouble("Height?");
    double a = UI.askDouble("Age?");
    calculateBMI(h, w, a);
}
public void calculateBMI(double height, double weight, int age)
{
    if(age < 10){
        UI.println ("Too young");
    }
    else{
        double bmi = weight / (height * height);
        if(bmi < 18.5){
            UI.println ("Below normal");
        }
        else if(bmi >= 25){
            UI.println ("Above normal");
        }
        else{
            UI.println ("Normal");
        }
    }
}
}

```



### 3. Writing methods that use objects

(10 marks)

A Butterfly simulator draws various butterflies on the screen with different colours and positions. A Butterfly can

1. Fly a specific distance either up, down, left, or right.
2. Land on the floor
3. Check if it collides with another Butterfly

The Butterfly class defines a constructor and three methods. Here is the documentation:

---

```
/** Constructor: */
```

```
Butterfly (Color c, double xPosition, double yPosition)  
// Creates a new Butterfly at the specified 'xPosition' and 'yPosition'  
// The parameter 'c' specifies the colour of the butterfly .
```

```
/** Methods: */
```

```
void fly (int distance, String direction)  
// flies the butterfly a certain distance that is specified by the first parameter  
// (i.e. distance) in the direction specified by the second parameter (i.e. direction).  
// The possible directions are: "Left", "Right", "Up", and "Down".
```

```
void land()  
// Vertically lands the butterfly on the ground
```

```
boolean isColliding (Butterfly bf)  
// Checks if the current butterfly collides with another butterfly object.  
// That object is passed to the parameter (i.e. bf)
```

---

Complete the following testButterfly method to test the Butterfly class. It should

1. Create 3 butterflies randomly on the screen. The screen dimension is 400 on the x direction and 500 on the y direction. The colour of the first butterfly is red, the second is green, and the third is black.
2. Fly the first butterfly 20 places to the right.
3. Fly the second butterfly 20 places down.
4. Land the third butterfly
5. Then, print "Collision is detected" if any butterfly collides with another butterfly.

```
public void testButterfly (){
```

```
}
```

```
public void testButterfly (){ *****
```

```
\Ans{
```

```
int x, y;
```

```
x = 0 + Math.random() * ( 400 - 0); // x = Math.random()*400
```

```
y = 0 + Math.random() * ( 500 - 0); // x = Math.random()*500
```

```
Butterfly bf1 = new Butterfly(Color.red, x, y);
```

```
x = 0 + Math.random() * ( 400 - 0); // x = Math.random()*400
```

```
y = 0 + Math.random() * ( 500 - 0); // x = Math.random()*500
```

```
Butterfly bf2 = new Butterfly(Color.green, x, y);
```

```
x = 0 + Math.random() * ( 400 - 0); // x = Math.random()*400
```

```
y = 0 + Math.random() * ( 500 - 0); // x = Math.random()*500
```

```
Butterfly bf3 = new Butterfly(Color.black, x, y);
```

```
bf1.fly(20, "right"); // or bf1.fly(20, "Right");
```

```
bf2.fly(20, "down"); // or bf2.fly(20, "Down");
```

```
bf3.land();
```

```
if (bf1.isColliding (bf2) || bf1.isColliding (bf3) || bf2.isColliding (bf3))
```

```
UI.println ("Collision is detected");
```

```
}
```

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