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

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

COMP 102: Lab Assessment 1

2021, Nov 22

Instructions

- Time allowed: **50 minutes**
- Attempt **all** the questions. There are 50 marks in total.
- To write your answers in BlueJ, follow the instructions on page 2.
- If you think a question is unclear, ask for clarification.
- This lab assessment contributes 15% of your final grade
  (But your mark will be increased to your final lab assessment mark if that is higher.)
- You may access the online Java Documentation.
- You may use dictionaries and calculators.
- You may not access any other web sites or online help of any kind.
- You may write notes and working on this paper, but make sure your answers are clear.

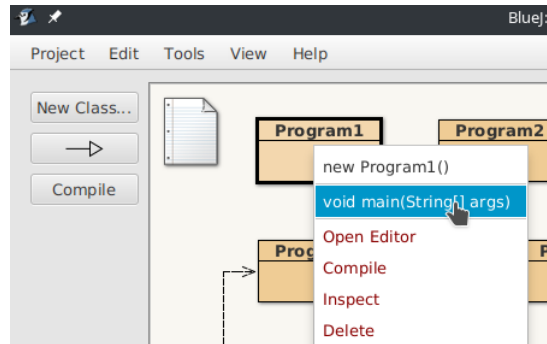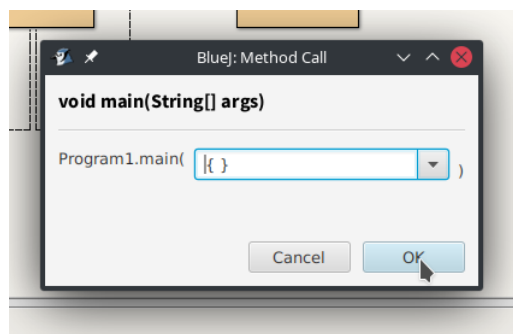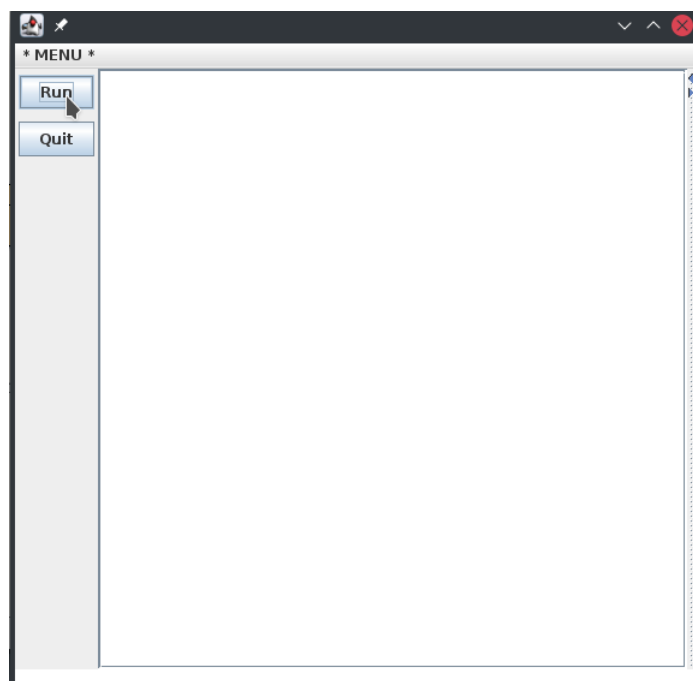| **Questions**	**Marks**	
1. User Input	[5]	
2. Writing programs with **if**	[12]	
3. Defining methods with parameters	[8]	
4. Writing methods that use objects	[10]	
5. Writing programs with **for**	[15]	
	TOTAL:	

Running the code:

1. Download the COMP102-2021T3-LabAssessment-1.zip file from
   https://ecs.wgtn.ac.nz/Courses/COMP102_2021T3/LabAssessment1

2. Unzip the file, and open the project in BlueJ.

3. Each question has been given its own class.
   To run them, right-click and select 'void main(String[] args)'.

Hit 'OK' when it prompts you for arguments.

4. The UI that pops up will have one or more buttons to run the code for
   the question, and a button that allows you to close the program.

Question 1. User Input   [5 marks]

Answer this question in the Program1 class.

Complete the printProduct() method in the Program1 class so that it:

- Asks the user for two doubles.
- Prints out the result of multiplying the two values.

For example:

```
First number:  5
Second number:  -1
The product is -5.0
```

Or:

```
First number:  7
Second number:  10
The product is 70.0
```

Complete the printProduct() method in the Program1 class so that it:

Question 2. Writing programs with if [12 marks]

Answer this question in the Program2 class.

(a) **[4 marks]** Weight Converter

Shui is baking a cake for their friend's birthday, but the recipe is from an American website and all the weight measurements are in ounces. Help Shui by writing a method that can convert between ounces and grams.

The user will provide the weight (as a double), and the units (as a string; either "oz" or "g").

If the user inputs the weight in ounces, your method should calculate and print the weight in grams. Otherwise, assume the weight is in grams, and your method should calculate and print the weight in ounces.

The formulae for the conversions are given below:

$$1\,g = 0.035oz$$

$$1\,oz = 28.35g$$

For example, if the user inputs 4 and "oz", you would use the second equation:

$$4 \times 28.35 = 113.4\,g$$

Examples:

```
Weight:  4
Units (oz or g):  oz
4 oz is 113.4 g

Weight:  100
Units (oz or g):  g
100 g is 3.5 oz
```

(b) **[8 marks]** Order Price Calculator

Complete the calculateOrderPrice() method to calculate the total price of an order.

Vivian runs an online store that sells enamel pride pins. They want customers to buy lots at a time, so they have decided to apply a discount to orders over a certain amount.

- The undiscounted price of each pin is $11.00.
- Orders over certain sizes receive increasing discounts, as shown in the table below:

Order Quanity	Discount (%)
Less than 3	0%
3-5	5%
6-10	10%
More than 10	15%

For example,

- if the quantity is 2, the total is $22.00 (no discount)
- if the quantity is 3, the total is $31.35 (5% discount)
- if the quantity is 15, the total is $140.25 (15% discount)

Print out the total cost rounded to 2 decimal places, for example

```
Enter quantity:  7
The total cost is:  $69.30
```

Question 3. Defining a method with parameters [8 marks]

Answer this question in the Program3 class.

Program3 has two methods. The drawStack() method calls the drawBox(...) method to draw two boxes stacked on top of each other.

- Complete the drawBall(...) method to draw a ball. The ball should be made of a coloured circle, surrounded by a black outline. You will need to define four parameters: the position in (x,y) co-ordinates, the radius of the ball, and the colour of the ball.
  - X and Y specify the **center** of the ball.
  - You should draw the filled oval first, then the outline.
  - The ball should have the specified radius.
- Complete the drawBalls() method to draw four balls by calling drawBall(...) four times using different parameters. Your method should draw the balls shown below.
  - The ball at (50, 150) is red and has a radius of 25
  - The ball at (300,200) is blue and has a radius of 40
  - The ball at (150, 75) is green and has a radius of 50
  - The ball at (275, 100) is yellow and has a radius of 25
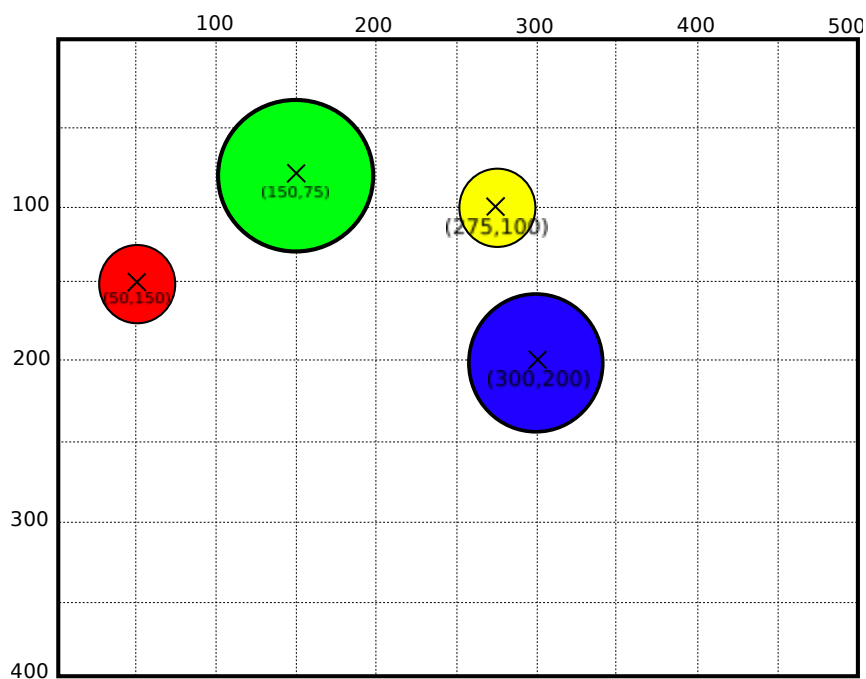
Question 4. Writing methods that use objects   [10 marks]

Answer this question in the Program4 class.

Program4 creates and animates a hero navigating past some pits and attacking monsters.

The documentation for the Hero and Slime classes are given below, and is accessible inside BlueJ as well.

```
// Constructor:
    public Hero(String color, String name, double xPosition)
    /** Creates a new Hero object of the specified name. e.g. "Nash", and cape colour.
        The hero is drawn at the specified x position. */

//Methods:
    public void move(String dir)
    /** The parameter can only be either "left" or "right"
        This method moves the hero a short distance in the specified direction. */

    public void jump()
    /** This method makes the hero jump in the direction that it is facing. */

    public void say(String text)
    /** This method makes the hero say the specified text */

    public void introduce()
    /** This method makes the hero introduce themself */
```

```
// Constructor:
    public Slime(String name, double xPosition)
    /** Creates a new Slime object of the specified name. e.g. "Bo".
        The slime is drawn at the specified x position. */

//Methods:
    public void move(String dir)
    /** The parameter can only be either "left" or "right"
        This method moves the slime a short distance in the specified direction. */

    public void introduce()
    /** This method makes the slime introduce themself */
```

(Question 4 continued)

Complete the animate() method in the Program4 class so that you:

1. Create a green Hero named "Nash", at position 100.
2. Create a slime named "Gel Capone", at position 460.
3. Make Nash introduce themself.
4. Make Nash move to the right.
5. Make Gel Capone move to the left.
6. Make Gel Capone introduce themself.
7. Make Nash say "Ahh! A slime!"
8. Make Nash move to the left
9. Make Nash jump

Nash and Gel Capone should start in the positions shown below:

Nash and Gel Capone should end up in the position shown below:

Question 5. Writing methods with for   **[15 marks]**

Answer this question in the Program5 class.

Program5 should do some analysis and draw a color-coded chart of temperature data.

The analyseTemperatures() method is done for you. It reads the information from a data file. It then calls three methods that you must complete.

(a) **[8 marks]** Complete the findMIn(...) and findMax(...)methods to find and **return** the minimum and maximum temperatures of the temperatures.

(b) **[7 marks]** Complete the plotTemperatures(...) method to draw a visualisation of temperatures in the graphics pane.

- This visualisation takes the form of a series of coloured lines, with each line representing a single day.
- The lines should be drawn from X_LEFT to X_RIGHT.
- The first line should start at Y_TOP, and then each successive line should be drawn one pixel further down the screen.
- You should use the supplied method getColor(double value) to get the appropriate colour for each value.

The output for 2015 should look like this:

* * * * * * * * * * * * * *