

Family Name: Other Names:

Student ID: Signature

COMP 102: Lab Assessment 1

2020, Nov 23

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.

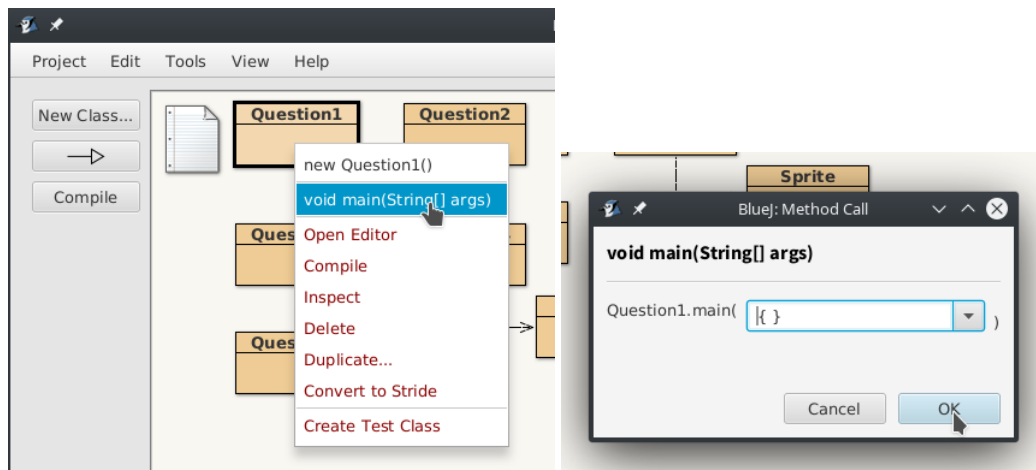
Questions

Marks

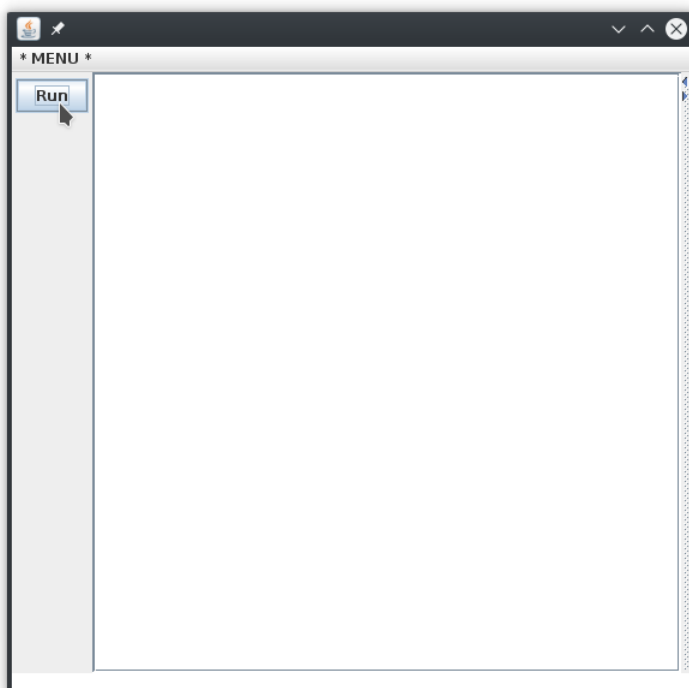
1. User Input	[5]	<input type="text"/>
2. Writing programs with if	[12]	<input type="text"/>
3. Defining methods with parameters	[8]	<input type="text"/>
4. Writing methods that use objects	[10]	<input type="text"/>
5. Writing programs with for	[15]	<input type="text"/>
	TOTAL:	<input type="text"/>

Running the code:

1. Download the termstest.zip file from the url on the whiteboard.
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 a 'Run' button that will execute the code for the question, once you've written it.



Question 1. User Input**[5 marks]**

Answer this question in the Program1 class.

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

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

For example:

```
First number: 5
Second number: 7
The sum is 12.0
```

Question 2. Writing programs with if**[12 marks]**

Answer this question in the Program2 class.

(a) [4 marks] Temperature Converter

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

The user will provide the temperature (as a double), and the units (as a string, which will be "C" or "F"). If the user inputs the temperature in Celsius, your method should calculate and print the temperature in Fahrenheit. Otherwise, assume the temperature is in Fahrenheit, and your method should calculate and print the temperature in Celsius.

The formulae for the conversions are given below:

$$f = (c * 9.0/5.0) + 32$$

$$c = (f - 32) * 5.0/9.0$$

For example, if the user inputs 19.5 and "C", you would use the first equation:

$$(19.5 * 9.0/5.0) + 32 = 67.1F$$

Examples:

```
Temperature: 0
Units (C or F): C
0.0°C is 32.0°F
```

```
Temperature: 100.4
Units (C or F): F
100.4°F is 38°C
```

(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 very high-quality stickers. 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 sticker is \$0.99.
- Orders over certain sizes receive increasing discounts, as shown in the table below:

Order Quantity	Discount (%)
Up to 100	0
Up to 300	5
up to 500	10
Over 500	15

For example,

- if the quantity is 100, the total is \$99.00 (no discount)
- if the quantity is 101, the total is \$94.99 (5% discount)
- if the quantity is 600, the total is \$504.90 (15% discount)

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

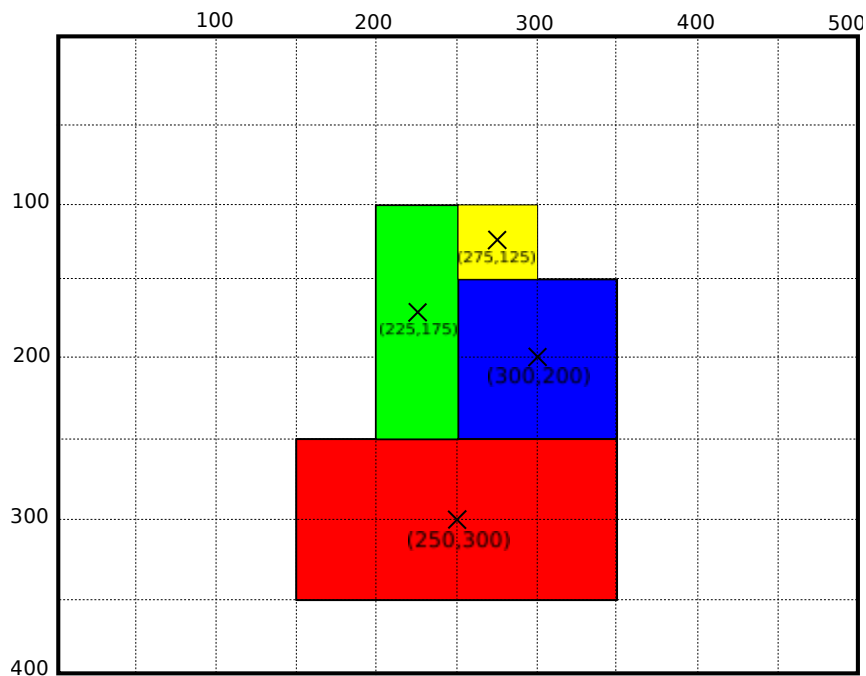
```
Enter quantity: 450
The total cost is: $400.95
```

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 drawBox(...) method to draw a box. The box should be made of a coloured rectangle, surrounded by a black outline. You will need to define five parameters: the position in (x,y) co-ordinates, the width of the box, the height of the box, and the colour of the box.
 - X and Y specify the **center** of the box.
 - You should draw the filled rectangle first, then the outline.
 - The box should have the specified height and width.
- Complete the drawStack() method to draw four boxes by calling drawBox(...) four times using different parameters. Your method should draw the stack shown below. The bottom box is red, the large square box is blue, the small square box is yellow, and the long thin box is green.



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. "Austin", 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 */
```

```
public void attack(Slime target)
  /** This method makes the hero perform its attack animation,
    and deals damage to the target . */
```

// 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 attack()
  /** This method makes the slime perform its attack animation. */
```

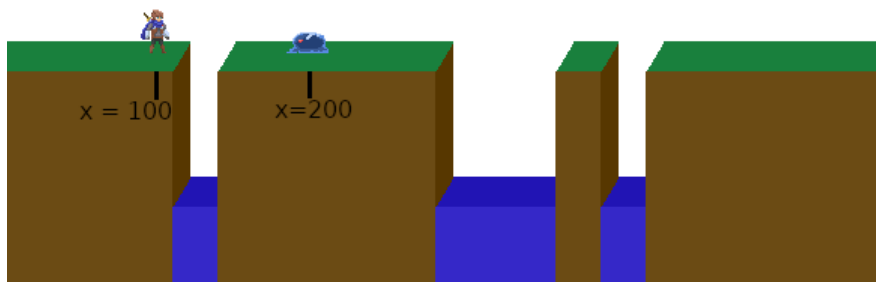
(Question 4 continued)

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

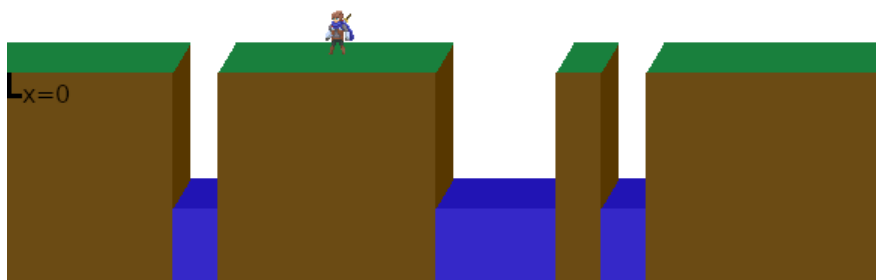
1. Create a blue Hero named "Austin", at position 100.
2. Create a slime named "Bo", at position 200.
3. Make Austin introduce themselves.
4. Make Austin jump over the pit immediately to their right.
5. Make Austin attack Bo.
6. Make Bo attack Austin.
7. Make Austin attack Bo a second time.
8. Make Austin move right twice.
9. Make Austin say "I can't jump that far"
10. Make Austin move left.

NB:Austin will not actually fall into a pit if they move over it, but your program must make them jump over the pits for your answer to be correct.

Austin and Bo should start in the positions shown below:



Austin 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 plot and do analysis on temperature data.

The analyseTemperatures() method is done for you. It asks the user for a sequence of temperatures and saves the values in an ArrayList. It then calls two methods that you must complete.

(a) **[5 marks]** Complete the findAverage(...) method to find and **return** the average of the temperatures.

(b) **[10 marks]** Complete the plotTemperatures(...) method to draw a line plot of the values on the graphics pane with a red line indicating the average temperature

- The code to draw the axes has been provided. Note that Y value can be positive or negative.
- Draw the points every 50 units along the x-axis, plotting the data along the y-axis
- You should start the line plot from the origin. You may assume the user enters between 1 and 9 values and all numbers are in the range of -50 to 50.
- Draw a red line indicating the average temperature

For example, if the user enters the following numbers:

```
-10.5
-5.2
6
14.3
26.7
23.3
done
```

the line plot should look like this: