

Family Name: Other Names:

Student ID: Signature

COMP 102: Test

2019, Aug 5

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 test contributes 15% of your final grade
(But your mark will be increased to your exam 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.

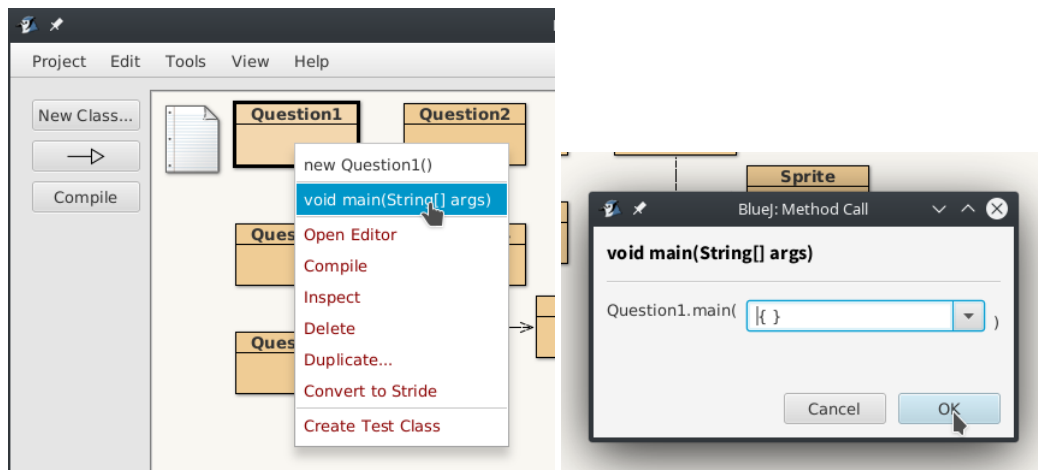
Questions

Marks

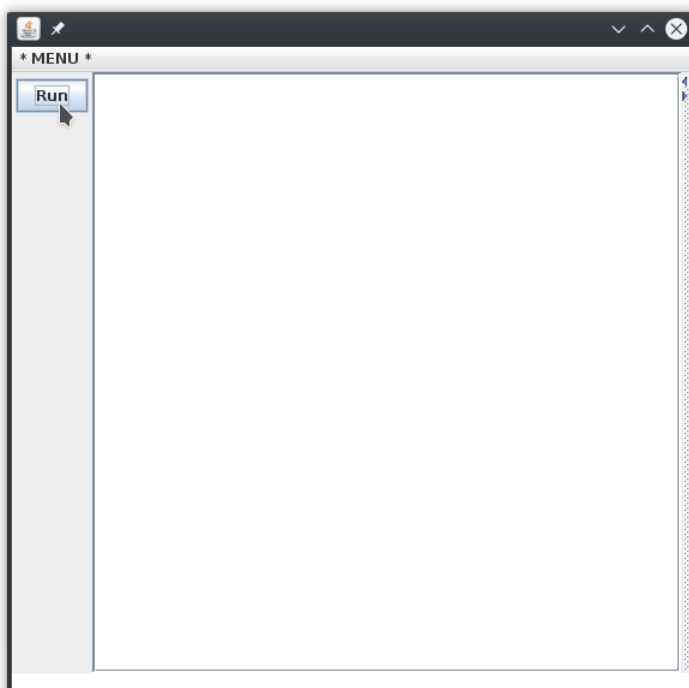
1. Finding Bugs	[5]	<input type="text"/>
2. Writing programs with if	[12]	<input type="text"/>
3. Defining methods with parameters	[8]	<input type="text"/>
4. Writing methods that use objects	[10]	<input type="text"/>
5. Writing programs with for	[15]	<input type="text"/>
	TOTAL:	<input type="text"/>

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. Finding Bugs**[5 marks]**

Answer this question in the Program1 class.

The following method is *supposed* to print out the largest value in a list, but it doesn't seem to be working properly. Find out what is wrong, and fix it.

The method needs to work for inputs such as these:

- 1 3 2 7 4 3 done → The biggest number was: 7
- 100.0 200.5 12.1 -1.4 5.0 done → The biggest number was: 200.5
- -4 -2 -6 -1 -7 done → The biggest number was: -1

```
public void printMax() {
    double max = 0.0;
    UI.print("Enter numbers, followed by 'done': ");
    while(UI.hasNextDouble()) {
        // Ask the user for a number
        int num = UI.nextInt();
        // Update max if the number is bigger
        if ( num < max ) {
            max = num;
        }
    }
    UI.nextLine(); // skip the 'done'
    UI.printf("The biggest number was: %.2f\n", max);
}
```

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

Answer this question in the Program2 class.

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

The method should

- Ask the user for how many widgets they want to purchase.
- Calculate the total price using the following table discounts.
 - The undiscounted price of each widget is \$12.99.
 - Note that any order over 5000 widgets receives a 15% discount to the entire order *instead of* any other discounts.

	Order Quantity	Discount (%)
Up to 5000	First 1,000	0
	Next 2,000	5
	Next 2,000	10
Over 5000		15 (on entire order)

For example,

- if the quantity is 765, the total is \$9,937.35 (no discount)
- if the quantity is 1,700, the total is \$21,628.35 ($1700 \times \$12.99 - 700 \times \$12.99 \times 5\%$)
- if the quantity is 6,000, the total is \$66,249.00 ($6000 \times \$12.99 \times 85\%$)
- Print out the total cost rounded to 2 decimal places, for example

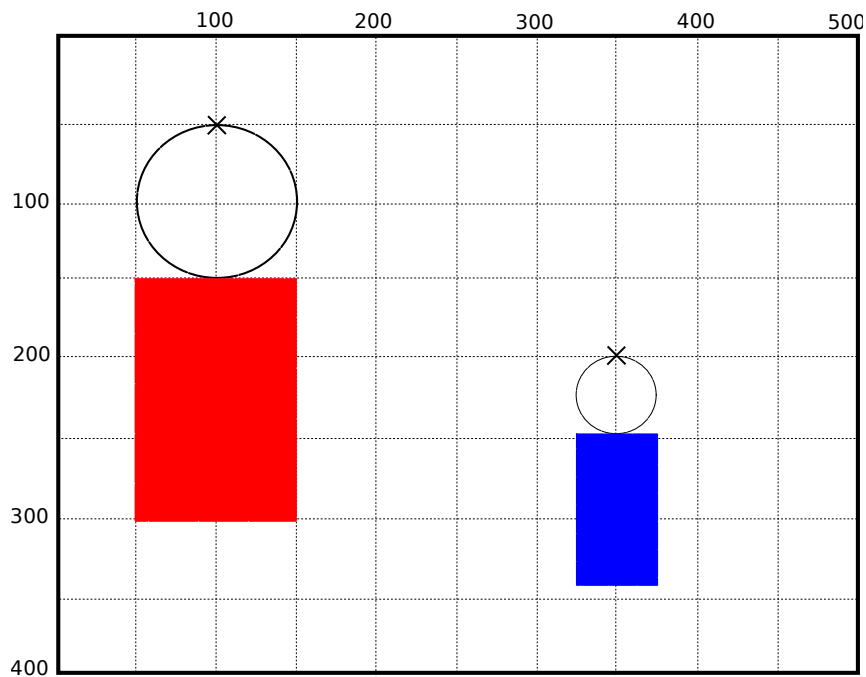
```
Enter quantity: 4500
The order total is: $55207.50
```

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

Answer this question in the Program3 class.

Program3 has two methods. The drawPeople() method calls the drawPerson(...) method to draw two very simplified people in different places.

- Complete the drawPerson(...) method to draw a person by drawing a circle and a coloured rectangle. You will need to define five parameters: the position in (x,y) coordinates, the diameter of the circle, and the height and colour of the rectangle.
 - The top of the circle is at the specified position (indicated by an X in the image below)
 - The circle is drawn with the specified diameter
 - The rectangle is drawn immediately below the circle, in the specified colour.
 - The rectangle has the specified height, and its width is the same as the diameter of the circle.
- Complete the drawPeople() method to draw two people by calling drawPerson(...) twice using different arguments. Your method should draw the people shown below. The larger person is red, and the smaller person is blue.



Question 4. Writing methods that use objects**[10 marks]**

Answer this question in the Program4 class.

Program4 creates and animates two heroic sprites navigating past some pits.

The documentation for the Sprite class is given below, and is accessible inside BlueJ as well.

// Constructor:

```
public Sprite(String name, double xPosition, boolean facingRight)
  /** Creates a new Sprite object of the specified name. e.g. "Alice".
    The sprite is drawn at the specified x position.
    If facingRight is true, the sprite is drawn facing right. */
```

//Methods:

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

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

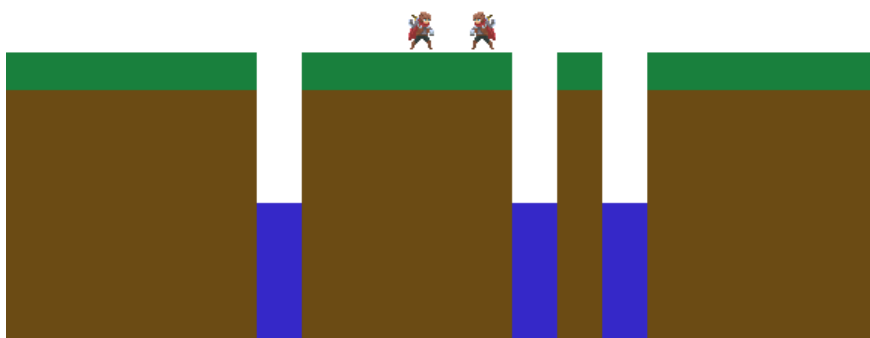
```
public void announce(String announcement)
  /** This method makes the sprite announce themselves using the specified
    announcement, and their name. */
```

```
public void attack()
  /** This method makes the sprite perform its attack animation. */
```

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

1. Creates a sprite named "Alice", at position 100, facing right.
2. Creates a second sprite named "Bob", at position 500, facing left.
3. Calls a sequence of five methods on each sprite, which will make them move to the middle (at the positions shown below), announce themselves, and then attack. The sprite should jump over any pits in its way.
 - Alice should announce "I am the hero!" and then give her name.
 - Bob should announce "No, I am the hero!" and then give his name.

NB: the sprites 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.



Question 5. Writing methods with for

[15 marks]

Answer this question in the Program5 class.

Program5 should do some analysis on a sequence of numbers.

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

(a) **[5 marks]** Complete the findMinimum(...) method to find and **return** the minimum of the numbers.

(b) **[10 marks]** Complete the plotNumbers(...) method to draw a line plot of the numbers on the graphics pane with a small circle on the minimum value(s)

- Draw the x-axis and the y-axis. The origin should be at (50, 50)
- Draw the points every 50 units, plotting the data along the x-axis (note the orientation of the plot in the example below)
- You should start the line plot from the origin. You may assume the user enters at least one and at most nine numbers and all numbers are in the range of [0, 350].
- Draw a small circle for the minimum number(s).

For example, if the user enters the following numbers:

```
200
100
300
0
50
150
done
```

the line plot should look like this:

