

Family Name: Other Names:

Student ID: Signature

COMP 102: Test

2019, Sep 16

Instructions

- Time allowed: **80 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.

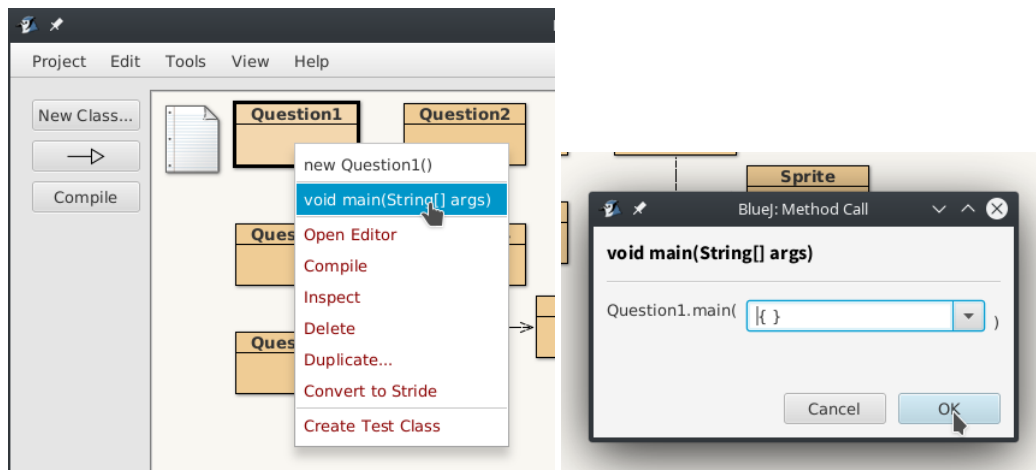
Questions

Marks

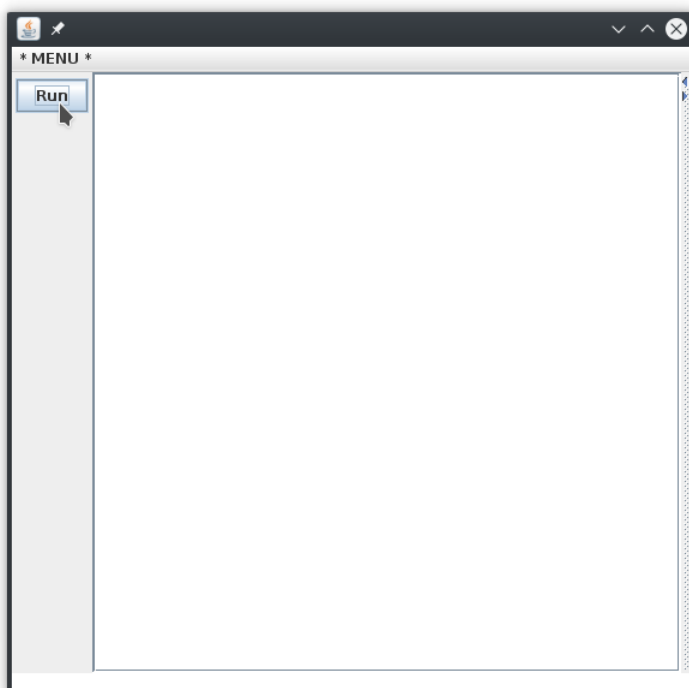
1. While Loops	[4]	<input type="text"/>
2. Files	[8]	<input type="text"/>
3. Defining Classes	[16]	<input type="text"/>
4. Event-Driven Input	[12]	<input type="text"/>
5. ArrayLists	[10]	<input type="text"/>
	TOTAL:	<input type="text"/>

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. While Loops**[4 marks]**

Answer this question in the Program1 class.

Use a while loop to complete the timesAndSquares() method in Program1, which should print out a list of the multiples of 3 (0,3,6,9,...) and their squares (0,9,36,81...).

It should do this for all multiples of 3 from 0-15 (inclusive).

The output will look like this.

```
0: 0
3: 9
6: 36
9: 81
12: 144
15: 225
```

Question 2. Files**[8 marks]**

Answer this question in the Program2 class.

Suppose a file contains a sequence of numbers. Complete the `printMultiples(...)` method in Program2 so that it will find and print all the numbers in a file that are multiples of the parameter provided to the method.

Hint: You will need to use the `%` operator.

For example, the file `q2data.txt` contains:

```
12 7 9 43 18 10 20 16 49 24
```

`printMultiples(3, "q2data.txt")` should print out

```
12.0 9.0 18.0 24.0
```

but `printMultiples(4, "q2data.txt")` should print out

```
12.0 20.0 16.0 24.0
```

The method `readAllNumbers(...)` is done for you. You can call it to read all the numbers in a file into an `ArrayList`.

Question 3. Defining Classes**[16 marks]**

Answer this question in the Program3 class.

This question is about a program that will draw a sheep on the graphics pane.

(a) **[10 marks]** Design a Sheep class to represent Sheep objects.

A sheep is represented on the screen by two ovals, and two sticks (lines) as depicted below. The larger oval is the sheep's body, and will get bigger as more wool grows.

The sheep class should contain:

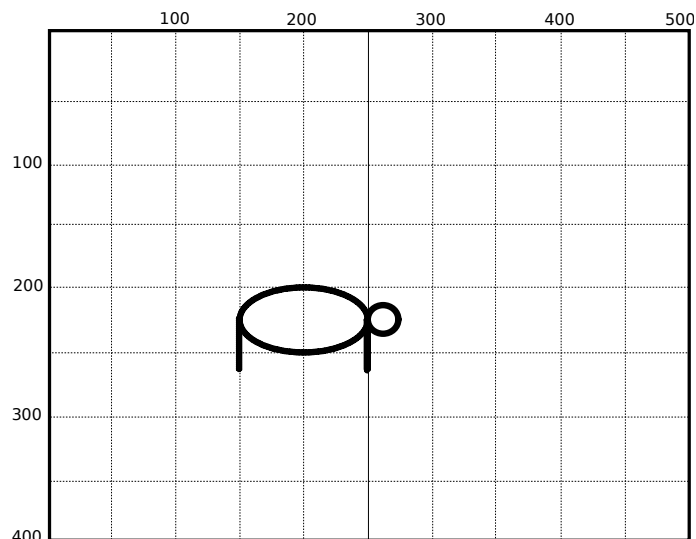
- Fields to store the location of the sheep, and the size of the sheep's wool.
 - The location specifies the centre of the sheep's body.
 - The size specifies the *height* of the sheep's body, and should start set to 25.
 - You need to make sure that the location of the sheep does not move as its wool grows.
- A constructor that initializes the fields. You are required to initialize the position of the sheep. Other fields should use default values.
- The draw() method that draws the sheep at the specified location with the right size.
 - The sheep's legs should be drawn first, using two black lines at either end of the body.
 - The body should be drawn next, using an unfilled oval with the correct length and height
 - The head is an un-filled circle at the right end of the body.
- The getSize() method that returns the size of the sheep's wool.
- The shear() method that reduces the size of the wool back to it's initial value.
- The grow() method that increases the size of the wool by 5.

You can check that your draw() method works using the Show button

(b) **[6 marks]** Complete the testSheep() method in the Program3 class that will:

- create a Sheep object at (100, 400)
- draw it in the graphics pane
- make it grow and be sheared.

Write a loop to make the sheep's wool grow 20 times. Whenever the wool size gets above 50, it should be shorn.



Question 4. Event-Driven Input**[12 marks]**

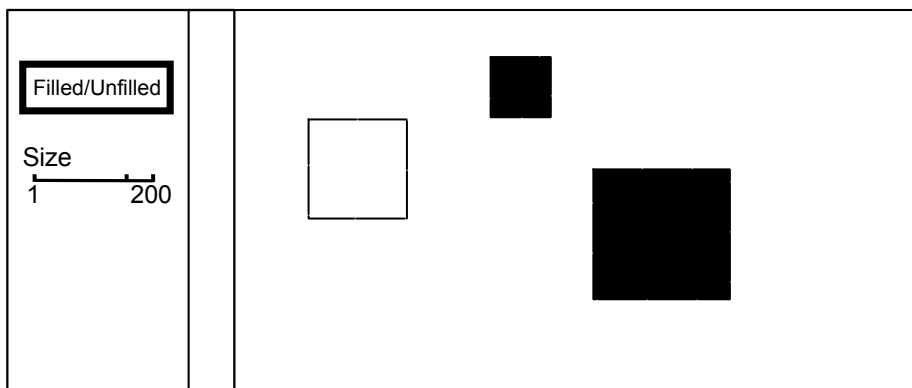
Answer this question in the Program4 class.

Complete the Program4 class so that it allows the user to draw filled and unfilled squares with different sizes on the graphics pane.

The program should have one button which allows the user to swap between “filled” and “unfilled”, and one slider which allows the user to set the size of the square to be drawn.

When the user releases the mouse at a position on the window, the program should draw a filled or unfilled square of the specified size centered at that position.

Hint: The addSlider method requires a name, a minimum value, a maximum value, an initial value and a method to call. (Use a min of 1, a max of 100, and an initial value of 20)



Question 5. ArrayLists**[10 marks]**

Answer this question in the Program5 class.

The q5data.txt file contains a sequence of numbers.

Complete the findSingletons() method in Program5 so that it will print out all the numbers in the file that do **not** match the numbers to either side of them.

For example, if the file contains

"2 2 3 5 3 3 3 9 1 2 3 5 5 5 5 5 5 4 4 4 2 2 1"

your method should print:

3 5 9 1 2 3

The first line (done for you) calls the readAllNumbers(...) method to load the numbers into an ArrayList. Numbers at the start and end are singletons if they do not match the number next to them.
