

Family Name: Other Names:

Student ID: Signature

COMP 102/112: Test 3

2021, 14 June

Instructions

- Time allowed: **120 minutes**
- Attempt **all** the questions. There are 120 marks in total.
- Write your answers in this test paper and hand in all sheets. (We have different instructions for distance students)
- If you think a question is unclear, ask for clarification.
- Brief Java documentation is provided with the test.
- This test contributes 50% of your final grade.
- You may use dictionaries and calculators.
- You may write notes and working on this paper, but make sure your answers are clear.
- You may assume all the programs import the ecs100 library and other standard libraries.

Questions:

1. Java basics [25]
2. Design a class [15]
3. Files [23]
4. ArrayLists of objects [34]
5. 2D arrays [23]

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.

Question 1. Java basics**[25 marks]****(a) [8 marks] Conditionals**

Write a method `shippingFee(...)` that calculates the shipping cost for a delivery address. The method should have a parameter to specify the address, and should return the cost as follows:

- Local: \$10.00
- Nation-wide: \$20.00
- International: \$50.00

The address is a string and it always contains "Wellington" for local, and contains "New Zealand" or "NZ" for nation-wide. You may assume any other address strings are international.

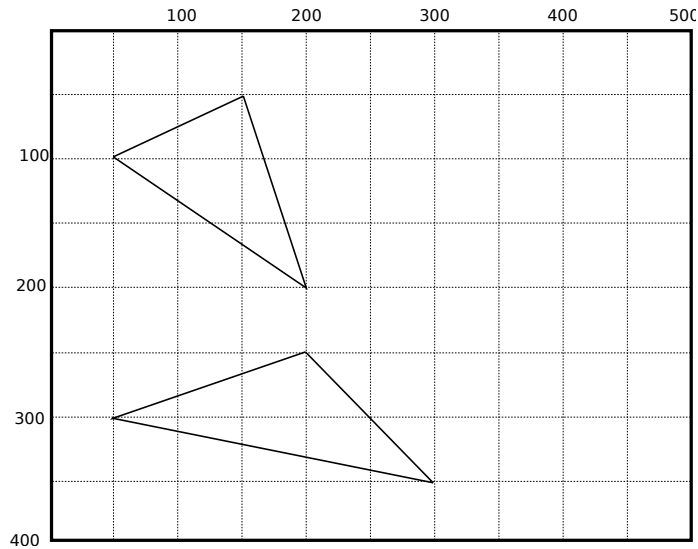
```
public double shippingFee(String address) {
```

```
}
```

(b) [9 marks] Define a method and call it in the same class.

Complete the drawTriangle(...) method below to draw a triangle in the graphics pane. It should have parameters that specify the coordinates of the three points of the triangle.

Complete the draw2Triangles() method to call the drawTriangle(...) method twice to draw the picture shown below:



```

public void drawTriangle(                                     ) {

}

public void draw2Triangles( ){

}

```

(c) [8 marks] Loop with an array.

Suppose the field `nums` contains an array of integers:

```
private int[] nums = new int[] {2,4,6,2,1,3,5,4,3,2,1,4,5,7,2,0,9};
```

Complete the `count(...)` method to print out the number of times a particular number appears in the array. The parameter specifies the number to look for.

For the array in `nums`, `count(3)` should print out

```
3 appeared 2 times.
```

`count(12)` should print out

```
12 appeared 0 times.
```

```
public void count(int x){
```

```
}
```

Question 2. Design a class**[15 marks]**

Suppose you are writing a program to allow users to list their used items for sale. An Item should have a name, a price and a list of features, e.g.

- name: "snowboard"
- price: 200.0
- features: "good condition", "150cm", "pickup only"

Complete the Item class on the facing page to specify Item objects.

- The fields should store the name, the price and the list of features.
- The constructor should create an Item object with the specified name and price. It should also create a new list in order to hold the features.
- The addFeature(...) method should allow the user to add a specific feature to the item.
- The print method should print the name, the price and each feature, all on separate lines.

```
public class Item {  
    // Fields  
  
    // Constructor  
    public Item(String name, double price) {  
  
    }  
    public void addFeature(String s) {  
  
    }  
  
    public void print() {  
  
    }  
}
```

Question 3. Files**[23 marks]**

A data file car.txt is shown below. Each line contains a car make, model and two integers for volume and weight.

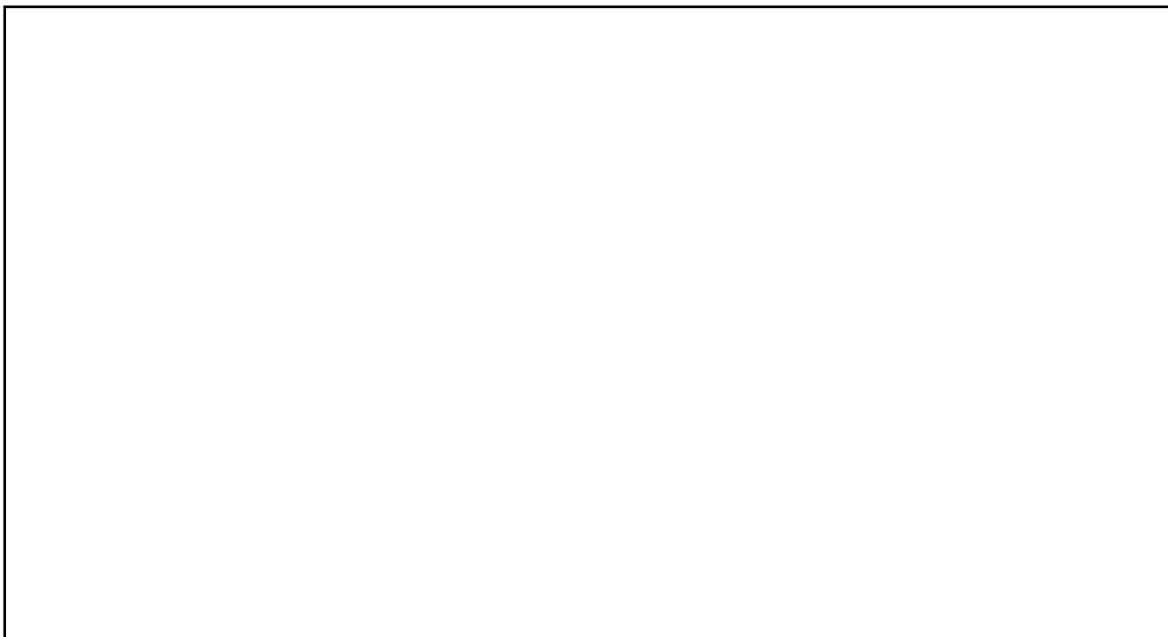
```
Toyota Aygo 1000 790
Mitsubishi Space Star 1200 1160
Fiat 500 900 865
BMW 1 1600 1365
Mercedes A-Class 1500 1365
Mazda 323 2200 1280
BMW 5 2000 1705
Ford Crown Victoria 4200 1873
```

(a) **[8 marks]** What will the following method print out?

```
public void testingFile () {

    try {
        List<String> lines = Files.readAllLines(Path.of("car.txt"));

        for (String line : lines) {
            Scanner scan = new Scanner(line);
            scan.next();
            scan.next();
            UI.println(scan.next());
        }
    } catch (IOException e) {UI.println("File error"); }
}
```



(b) [15 marks] Complete the following `printModel()` method that will read the `car.txt` file, extract the model in each line and print them on separate lines.

Please note that the car make is always one word (the first word on each line), but the model can be one word, two words or a single integer number. The rest of the line (volume and weight) are always integers.

For example, if the file `car.txt` contains data showing on the facing page, your method should print out

```
Aygo
Space Star
500
1
A-Class
323
5
Crown Victoria
```

```
public void printModel() {
    try {
        List<String> lines = Files.readAllLines(Path.of("car.txt"));

    } catch (IOException e) {UI.println("File error");}
}
```

Question 4. ArrayLists of Objects**[34 marks]**

The program has two classes: a ShoeStore class and a Shoe class.

The Shoe class below defines Shoe objects.

```
public class Shoe {
    private String brand;
    private int size;           //The shoe size is European size.
    private double price;

    public Shoe(String b, int s, double p) {
        this.brand = b;
        this.size = s;
        this.price = p;
    }

    public String getBrand() {
        return this.brand;
    }

    public int getSize() {
        return this.size;
    }

    public double getPrice() {
        return this.price;
    }
}
```

(Question 4 continued)

The ShoeStore class declares a shoes field to store the list of Shoe objects:

```
private ArrayList<Shoe> shoes = new ArrayList<Shoe>();
```

(a) [8 marks] What will the following method print out?

```
public void testing () {  
    Shoe a = new Shoe("converse", 42, 120.00);  
    Shoe b = new Shoe("ecco", 40, 260.00);  
    Shoe c = new Shoe("vans", 38, 100.00);  
    Shoe d = new Shoe("nike", 42, 250.00);  
    this.shoes.clear ();  
    this.shoes.add(a);  
    this.shoes.add(new Shoe("adidas", 42, 200.00));  
    this.shoes.add(0, b);  
    this.shoes.add(c);  
    this.shoes.add(1,d);  
    for(Shoe m: shoes){  
        UI.println (m.getBrand());  
    }  
  
    UI.println (this.shoes.get(0).getSize ());  
}
```

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(Question 4 continued on next page)

(Question 4 continued)

(b) [14 marks] The following findShoe(...) method has two parameters which are the brand and the size.

Complete the findShoe(...) method that will search the list of shoes to find all shoes in the particular brand and size, and print their prices.

If nothing is found, then print a "not found" message.

```
public void findShoe(String brand, int size) {
```

```
}
```

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(Question 4 continued on next page)

(Question 4 continued)

(c) [12 marks] Complete the following `returnOneSize(...)` method that will find all the shoes in one particular size, save them in a new `ArrayList`, and return the `ArrayList`.

```
public ArrayList<Shoe> returnOneSize(int size) {
```

```
}
```

SPARE PAGE FOR EXTRA ANSWERS

Cross out rough working that you do not want marked.
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Question 5. 2D Arrays**[23 marks]**

The matrix field is declared to hold a 2D array as follows:

```
private int [][] matrix = new int[][]{{ 10, 20, 31, 11, 11, 11, 25},
                                       { 15, 15, 15, 15, 14, 14, 14},
                                       { 14, 14, 14, 14, 10, 20, 17},
                                       { 30, 20, 22, 22, 22, 22, 22},
                                       { 20, 11, 11, 11, 16, 19, 30}};
```

(a) **[8 marks]** What will the following method print out?

```
public void testing2DArray() {
    Ul.println (this.matrix [0][3]);
    Ul.println (this.matrix.length);
    Ul.println (this.matrix [2]);
    for(int j=0; j < 3; j++) {
        Ul.println (this.matrix[j ][2]);
    }
}
```

(Question 5 continued)

(b) [15 marks] Complete the following `findLongestRepeat()` method that will find the longest sequence of duplicate numbers in any row of the array in the matrix field.

For example, if the 2D array is declared as follows: (the same as part a)

```
private int [][] matrix = new int[][]{{ 10, 20, 31, 11, 11, 11, 25},
                                       { 15, 15, 15, 15, 14, 14, 14},
                                       { 14, 14, 14, 14, 10, 20, 17},
                                       { 30, 20, 22, 22, 22, 22, 22},
                                       { 20, 11, 11, 11, 16, 19, 30}};
```

`findLongestRepeat()` should print out the following:

```
5 * 22 on row 3, from 2 to 6
```

Please note that:

- 5 is the length of the longest sequence
- 22 is the repeated value
- 3 is the row index
- 2 is the start column index
- 6 is the end column index

Your method should still work whatever the size of the array is, as long as it contains at least one value.

```
public void findLongestRepeat(){
```

```
}
```
