

OOP Lab 1

# **Report for the OOP Lab week 1**

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April 2023

# 1 Very first Java Programs

## 1.1 Problems

2.2.1 Write and compile the first Java application:

```

1 //Example 1: HelloWorld.java
2 //Text-printing program
3 public class HelloWorld {
4
5    public static void main(String args[]){
6        System.out.println("Xin chao \n cac ban!");
7        System.out.println("Hello \t world!");
8
9    } // end of method main
10 }
```

⇒ Source code:

The screenshot shows a Java development environment with the following details:

- Source Code:**

```

1 package Lab01;
2 public class HelloWorld {
3     public static void main(String args[]) { System.out.println("Hello World"); }
4 }
```
- Terminal Output:**

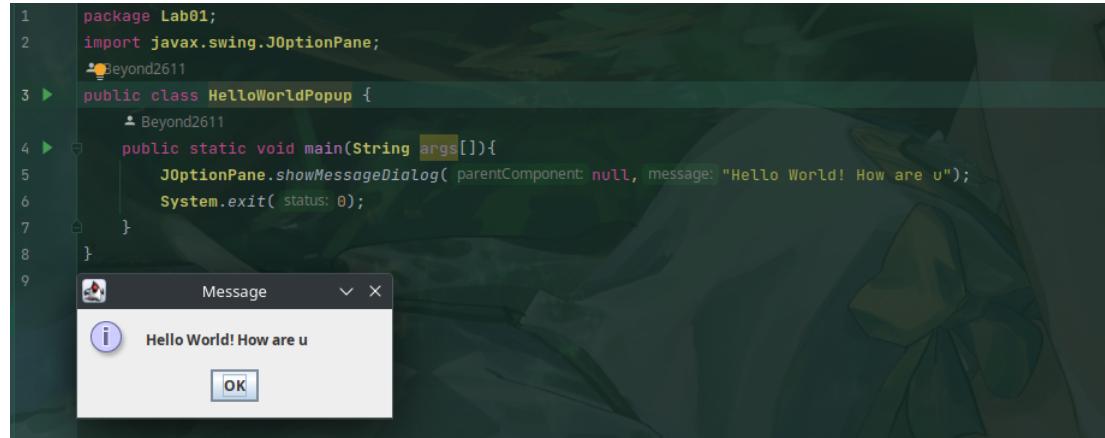
```
[0] ~/Classes/OOP/Lab01 $ java HelloWorld.java
Hello World
beyond@beyond [0] ~/Classes/OOP/Lab01 $
```

2.2.2 Write and compile the first dialog Java application:

```

1 // Example 2: FirstDialog.java
2 import javax.swing.JOptionPane;
3 public class FirstDialog{
4    public static void main(String[] args){
5        JOptionPane.showMessageDialog(null,"Hello world! How are you?");
6        System.exit(0);
7    }
8 }
```

⇒ Source code:



```

1 package Lab01;
2 import javax.swing.JOptionPane;
3 Beyond2611
4 public class HelloWorldPopup {
5     Beyond2611
6     public static void main(String args[]){
7         JOptionPane.showMessageDialog( parentComponent: null, message: "Hello World! How are u");
8         System.exit( status: 0);
9     }
10 }
```

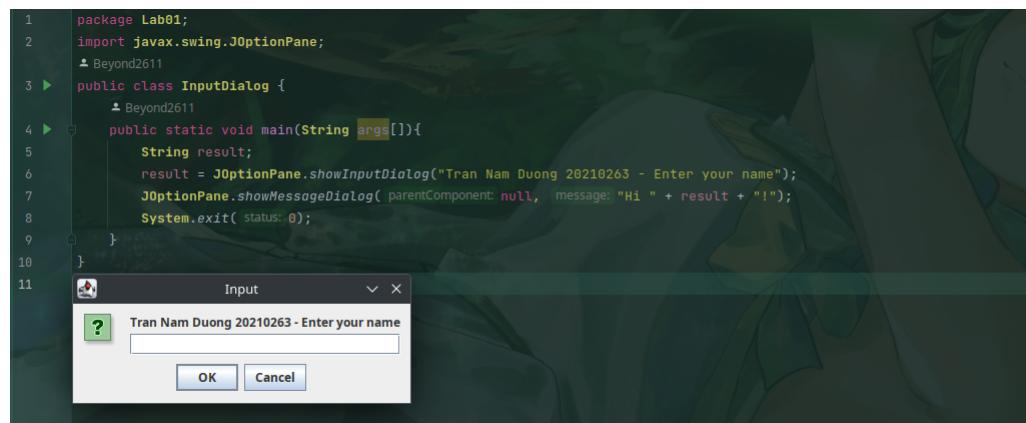
A screenshot of a Java IDE showing the source code for `HelloWorldPopup.java`. The code uses `JOptionPane.showMessageDialog` to display a message box with the text "Hello World! How are u". Below the code editor, a message dialog box titled "Message" is displayed, showing the same text "Hello World! How are u" with an "OK" button.

2.2.3 Write and compile the first input dialog Java applicaion:

```

1 // Example 3: HelloNameDialog.java
2 import javax.swing.JOptionPane;
3 public class HelloNameDialog{
4     public static void main(String[] args){
5         String result;
6         result = JOptionPane.showInputDialog("Please enter your name:");
7         JOptionPane.showMessageDialog(null, "Hi "+ result + "!");
8         System.exit(0);
9     }
10 }
```

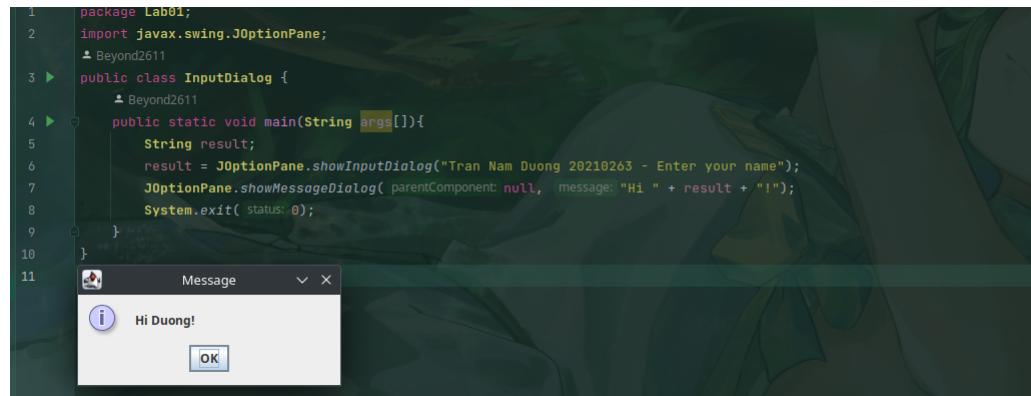
⇒ Source code:



```

1 package Lab01;
2 import javax.swing.JOptionPane;
3 Beyond2611
4 public class InputDialog {
5     Beyond2611
6     public static void main(String args[]){
7         String result;
8         result = JOptionPane.showInputDialog("Tran Nam Duong 20210263 - Enter your name");
9         JOptionPane.showMessageDialog( parentComponent: null, message: "Hi " + result + "!");
10    System.exit( status: 0);
11 }
```

A screenshot of a Java IDE showing the source code for `InputDialog.java`. The code uses `JOptionPane.showInputDialog` to prompt the user for their name, with a placeholder text "Tran Nam Duong 20210263 - Enter your name". Below the code editor, an input dialog box titled "Input" is displayed, showing the placeholder text and two buttons: "OK" and "Cancel".



The screenshot shows a Java code editor with a file named `InputDialog.java`. The code contains a main method that prompts the user for their name and displays a message dialog with the result. A message dialog titled "Message" is visible in the foreground, showing the text "Hi Duong!".

```
1 package Lab01;
2 import javax.swing.JOptionPane;
3 public class InputDialog {
4     public static void main(String[] args){
5         String result;
6         result = JOptionPane.showInputDialog("Tran Nam Duong 20210263 - Enter your name");
7         JOptionPane.showMessageDialog( parentComponent: null, message: "Hi " + result + "!" );
8         System.exit( status: 0 );
9     }
10 }
11 
```

2.2.4 Write and compile the following example:

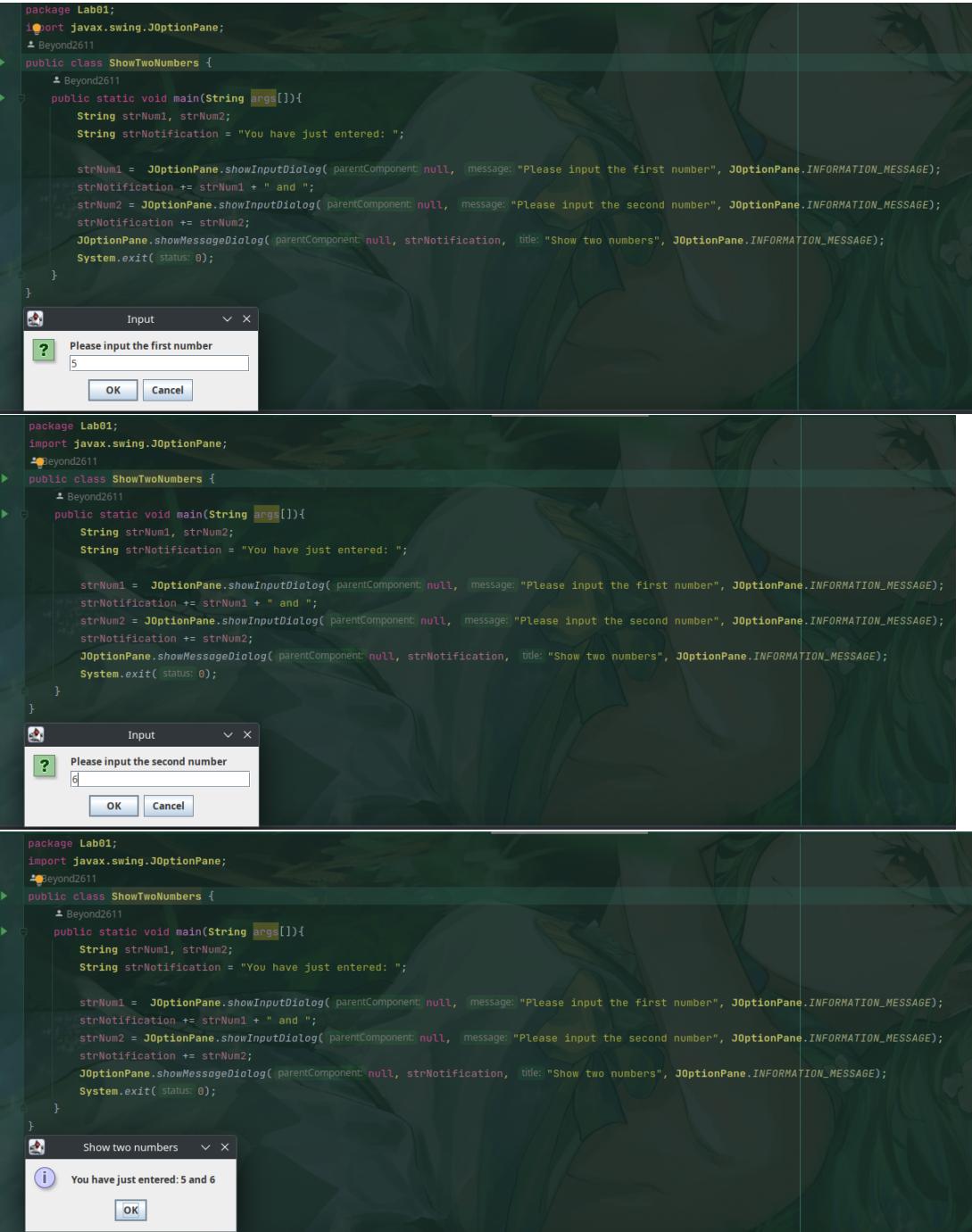
```
1 // Example 5: ShowTwoNumbers.java
2 import javax.swing.JOptionPane;
3 public class ShowTwoNumbers {
4     public static void main(String[] args){
5         String strNum1, strNum2;
6         String strNotification = "You've just entered: ";
7
8         strNum1 = JOptionPane.showInputDialog(null,
9                 "Please input the first number: ","Input the first number",
10                JOptionPane.INFORMATION_MESSAGE);
11         strNotification += strNum1 + " and ";
12
13         strNum2 = JOptionPane.showInputDialog(null,
14                 "Please input the second number: ","Input the second number",
15                JOptionPane.INFORMATION_MESSAGE);
16         strNotification += strNum2;
17
18         JOptionPane.showMessageDialog(null,strNotification,
19                 "Show two numbers", JOptionPane.INFORMATION_MESSAGE);
20         System.exit(0);
21     }
22 }
```

⇒ Source code:

```

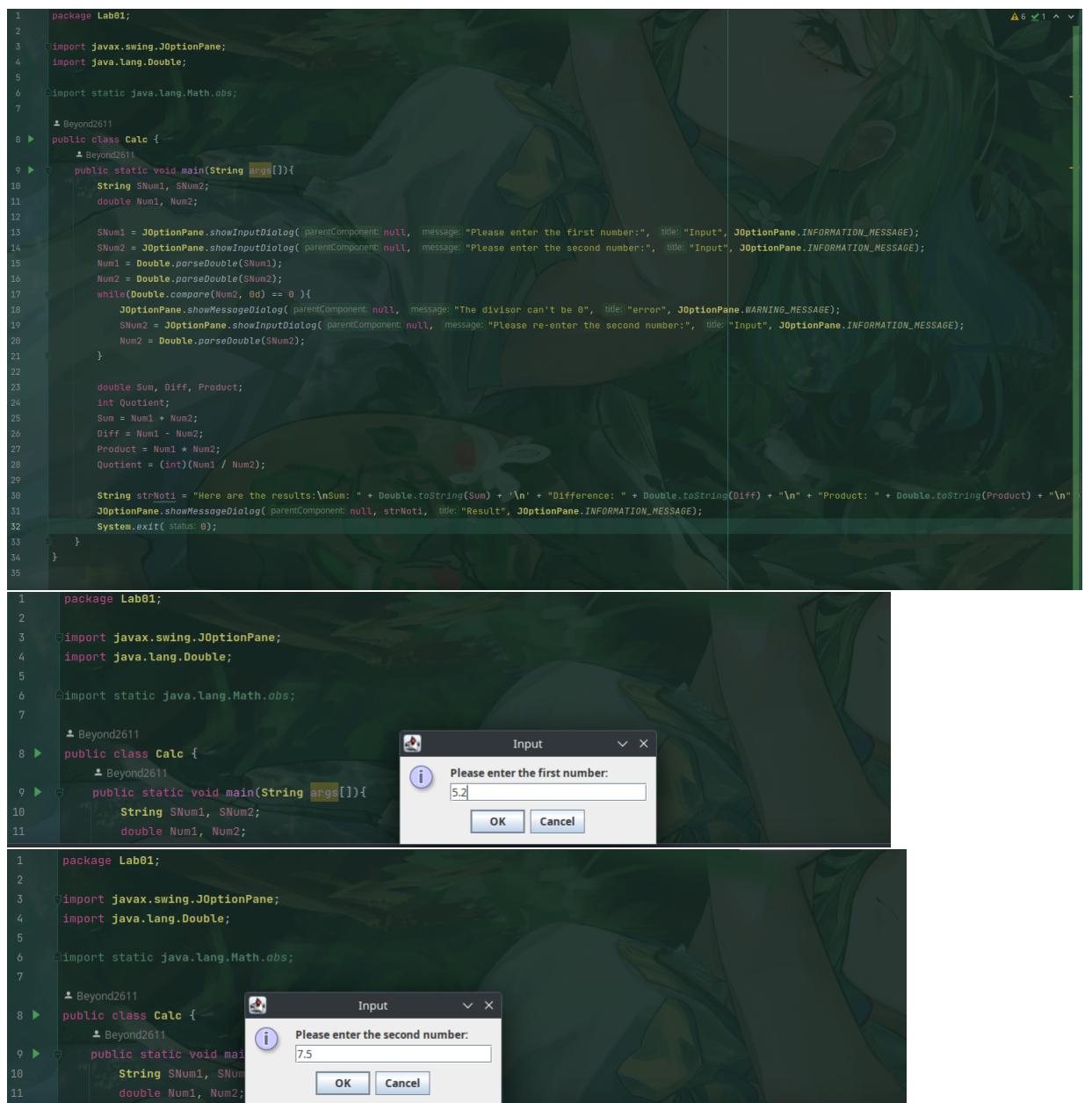
1 package Lab01;
2 import javax.swing.JOptionPane;
3 public class ShowTwoNumbers {
4     public static void main(String args[]){
5         String strNum1, strNum2;
6         String strNotification = "You have just entered: ";
7
8         strNum1 = JOptionPane.showInputDialog( parentComponent: null, message: "Please input the first number", JOptionPane.INFORMATION_MESSAGE);
9         strNotification += strNum1 + " and ";
10        strNum2 = JOptionPane.showInputDialog( parentComponent: null, message: "Please input the second number", JOptionPane.INFORMATION_MESSAGE);
11        strNotification += strNum2;
12        JOptionPane.showMessageDialog( parentComponent: null, strNotification, title: "Show two numbers", JOptionPane.INFORMATION_MESSAGE);
13        System.exit( status: 0 );
14    }
15 }

```



The screenshot shows three panels of Java code and their corresponding GUI outputs. The top panel shows the initial code. The middle panel shows two 'Input' dialog boxes, each prompting for a number and displaying the value '5' and '6' respectively. The bottom panel shows a single 'Show two numbers' dialog box with the message 'You have just entered: 5 and 6'.

2.2.5 Write a program to calculate sum, difference, product, and quotient of 2 double numbers which are entered by users.:  
 ⇒ Source code:



```

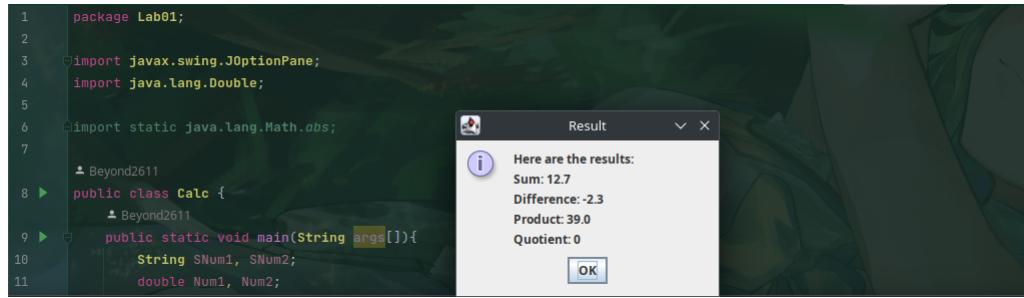
1 package Lab01;
2
3 import javax.swing.JOptionPane;
4 import java.lang.Double;
5
6 import static java.lang.Math.abs;
7
8 ▲ Beyond2611
9 ▶ public class Calc {
10   ▲ Beyond2611
11   ▶ public static void main(String args[]){
12     String SNum1, SNum2;
13     double Num1, Num2;
14
15     SNum1 = JOptionPane.showInputDialog( parentComponent: null, message: "Please enter the first number:", title: "Input", JOptionPane.INFORMATION_MESSAGE);
16     SNum2 = JOptionPane.showInputDialog( parentComponent: null, message: "Please enter the second number:", title: "Input", JOptionPane.INFORMATION_MESSAGE);
17     Num1 = Double.parseDouble(SNum1);
18     Num2 = Double.parseDouble(SNum2);
19     while(Double.compare(Num2, 0d) == 0 ){
20       JOptionPane.showMessageDialog( parentComponent: null, message: "The divisor can't be 0", title: "error", JOptionPane.WARNING_MESSAGE);
21       SNum2 = JOptionPane.showInputDialog( parentComponent: null, message: "Please re-enter the second number:", title: "Input", JOptionPane.INFORMATION_MESSAGE);
22       Num2 = Double.parseDouble(SNum2);
23
24     }
25
26     double Sum, Diff, Product;
27     int Quotient;
28     Sum = Num1 + Num2;
29     Diff = Num1 - Num2;
30     Product = Num1 * Num2;
31     Quotient = (int)(Num1 / Num2);
32
33     String strNoti = "Here are the results:\nsum: " + Double.toString(Sum) + "\n" + "Difference: " + Double.toString(Diff) + "\n" + "Product: " + Double.toString(Product) + "\n";
34     JOptionPane.showMessageDialog( parentComponent: null, strNoti, title: "Result", JOptionPane.INFORMATION_MESSAGE);
35     System.exit( status: 0 );
36   }
37 }

```

```

1 package Lab01;
2
3 import javax.swing.JOptionPane;
4 import java.lang.Double;
5
6 import static java.lang.Math.abs;
7
8 ▲ Beyond2611
9 ▶ public class Calc {
10   ▲ Beyond2611
11   ▶ public static void main(String args[]){
12     String SNum1, SNum2;
13     double Num1, Num2;
14
15     SNum1 = JOptionPane.showInputDialog( parentComponent: null, message: "Please enter the first number:", title: "Input", JOptionPane.INFORMATION_MESSAGE);
16     SNum2 = JOptionPane.showInputDialog( parentComponent: null, message: "Please enter the second number:", title: "Input", JOptionPane.INFORMATION_MESSAGE);
17     Num1 = Double.parseDouble(SNum1);
18     Num2 = Double.parseDouble(SNum2);
19
20     double Sum, Diff, Product;
21     int Quotient;
22     Sum = Num1 + Num2;
23     Diff = Num1 - Num2;
24     Product = Num1 * Num2;
25     Quotient = (int)(Num1 / Num2);
26
27     String strNoti = "Here are the results:\nsum: " + Double.toString(Sum) + "\n" + "Difference: " + Double.toString(Diff) + "\n" + "Product: " + Double.toString(Product) + "\n";
28     JOptionPane.showMessageDialog( parentComponent: null, strNoti, title: "Result", JOptionPane.INFORMATION_MESSAGE);
29     System.exit( status: 0 );
30   }
31 }

```



The screenshot shows a Java code editor and a 'Result' dialog box. The code editor contains the following Java code:

```
1 package Lab01;
2
3 import javax.swing.JOptionPane;
4 import java.lang.Double;
5
6 import static java.lang.Math.abs;
7
8 ▲ Beyond2611
9 ► public class Calc {
10   ▲ Beyond2611
11   ►   public static void main(String args[]){
12     String SNum1, SNum2;
13     double Num1, Num2;
```

The 'Result' dialog box displays the output of the program:

Here are the results:  
Sum: 12.7  
Difference: -2.3  
Product: 39.0  
Quotient: 0

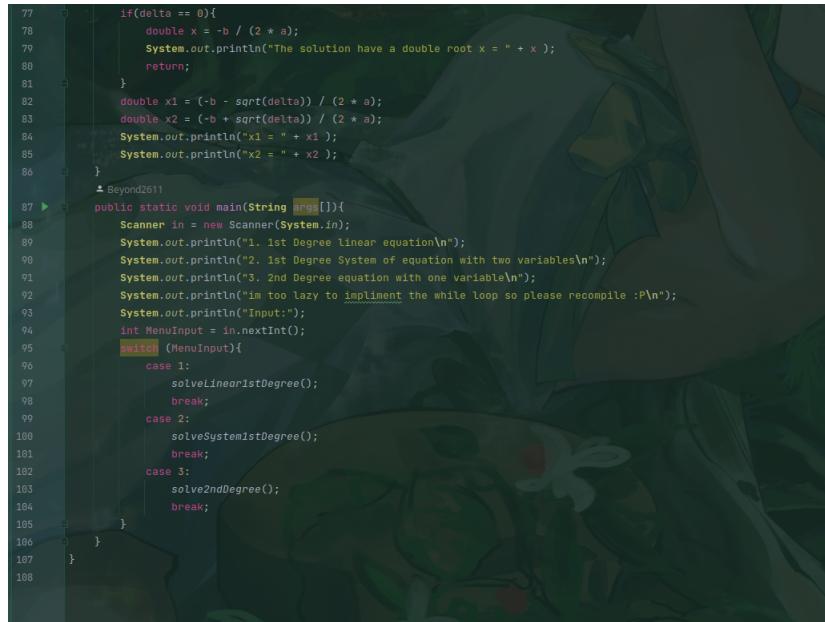
OK

2.2.6 Write a program to solve:

- The first-degree equation (linear equation) with one variable.
- The system of first-degree equations (linear system) with two variables.
- The second-degree equation with one variable.

⇒ Source code:

```
1 package Lab01;
2 import java.util.Scanner;
3
4 import static java.lang.Math.sqrt;
5
6 ▲ Beyond2611
7 public class Solve {
8     usage ▲ Beyond2611
9     public static void solveLinearistDegree(){
10         double a, b;
11         Scanner input = new Scanner(System.in);
12         System.out.println("Input a:");
13         a = input.nextDouble();
14         System.out.println("Input b:");
15         b = input.nextDouble();
16
17         if(Double.compare(a, 0d) == 0){
18             System.out.println("The solution is all x");
19             return;
20         }
21         double x = -b / a;
22         System.out.println("x = " + Double.toString(x));
23     }
24
25     usage ▲ Beyond2611
26     public static void solveSystem1stDegree(){
27         double a11, a12, a21, a22, b1, b2;
28         Scanner input = new Scanner(System.in);
29         System.out.println("Input a11:");
30         a11 = input.nextDouble();
31         System.out.println("Input a12:");
32         a12 = input.nextDouble();
33         System.out.println("Input b1:");
34         b1 = input.nextDouble();
35         System.out.println("Input a21:");
36         a21 = input.nextDouble();
37         System.out.println("Input a22:");
38         a22 = input.nextDouble();
39         System.out.println("Input b2:");
40         b2 = input.nextDouble();
41
42         double eps = 1e-15;
43         double det = (a11 * a22) - (a21 * a12);
44         if(det == 0){
45             System.out.println("The system has no solutions or infinite many solutions exists");
46             return;
47         }
48         double x1 = (b1 * a22 - a12 * b2) / det;
49         double x2 = (a11 * b2 - b1 * a21) / det;
50         System.out.println("The system has the solution:\nx = " + x1 + "\ny = " + x2);
51     }
52
53     usage ▲ Beyond2611
54     public static void solve2ndDegree(){
55         double a, b, c;
56         Scanner input = new Scanner(System.in);
57         System.out.println("Input a:");
58         a = input.nextDouble();
59         System.out.println("Input b:");
60         b = input.nextDouble();
61         System.out.println("Input c:");
62         c = input.nextDouble();
63
64         if(a == 0 && b == 0 && c == 0){
65             System.out.println("The solution is all x");
66             return;
67         }
68         if(a == 0 && b == 0)
69         {
70             System.out.println("No solution");
71             return;
72         }
73         if(a == 0)
74         {
75             double x = -c / b;
76             System.out.println("x = " + x );
77             return;
78         }
79
80         double delta = b * b - 4 * a * c;
81         if(delta == 0){
82             System.out.println("One solution");
83             double x = -b / (2 * a);
84             System.out.println("x = " + x );
85             return;
86         }
87         else if(delta > 0){
88             System.out.println("Two distinct real solutions");
89             double x1 = (-b - sqrt(delta)) / (2 * a);
90             double x2 = (-b + sqrt(delta)) / (2 * a);
91             System.out.println("x1 = " + x1);
92             System.out.println("x2 = " + x2);
93             return;
94         }
95         else if(delta < 0){
96             System.out.println("Two complex conjugate solutions");
97             double x = -b / (2 * a);
98             System.out.println("x = " + x );
99             return;
100        }
101    }
102 }
```



```

77     if(delta == 0){
78         double x = -b / (2 * a);
79         System.out.println("The solution have a double root x = " + x );
80         return;
81     }
82     double x1 = (-b - sqrt(delta)) / (2 * a);
83     double x2 = (-b + sqrt(delta)) / (2 * a);
84     System.out.println("x1 = " + x1 );
85     System.out.println("x2 = " + x2 );
86 }
87 
88 public static void main(String args[]){
89     Scanner in = new Scanner(System.in);
90     System.out.println("1. 1st Degree linear equation\n");
91     System.out.println("2. 1st Degree System of equation with two variables\n");
92     System.out.println("3. 2nd Degree equation with one variable\n");
93     System.out.println("im too lazy to implement the while loop so please recompile :P\n");
94     System.out.print("Input:");
95     int MenuInput = in.nextInt();
96     switch (MenuInput){
97         case 1:
98             solveLinear1stDegree();
99             break;
100        case 2:
101            solveSystem1stDegree();
102            break;
103        case 3:
104            solve2ndDegree();
105            break;
106    }
107 }
108 
```

**beyond@beyond [0] ~/Classes/OOP/Lab01 \$ java Solve.java**

1. 1st Degree linear equation

2. 1st Degree System of equation with two variables

3. 2nd Degree equation with one variable

im too lazy to implement the while loop so please recompile :P

Input:

1

Input a:

2

Input b:

5

x = -2.5

**beyond@beyond [0] ~/Classes/OOP/Lab01 \$ java Solve.java**

1. 1st Degree linear equation

2. 1st Degree System of equation with two variables

3. 2nd Degree equation with one variable

im too lazy to implement the while loop so please recompile :P

Input:

2

Input a11:

3

Input a12:

2

Input b1:

11

Input a21:

2

Input a22:

3

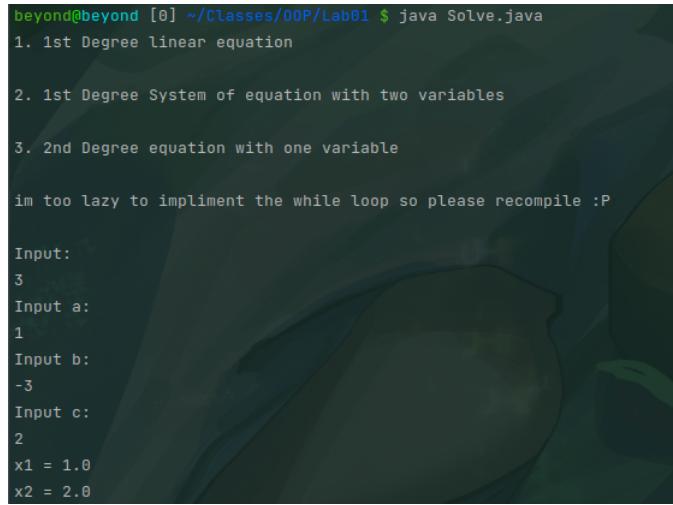
Input b1:

16

The system has the solution:

x = 0.2

y = 5.2



```
beyond@beyond [0] ~/classes/OOP/Lab01 $ java Solve.java
1. 1st Degree linear equation

2. 1st Degree System of equation with two variables

3. 2nd Degree equation with one variable

im too lazy to impliment the while loop so please recompile :P

Input:
3
Input a:
1
Input b:
-3
Input c:
2
x1 = 1.0
x2 = 2.0
```

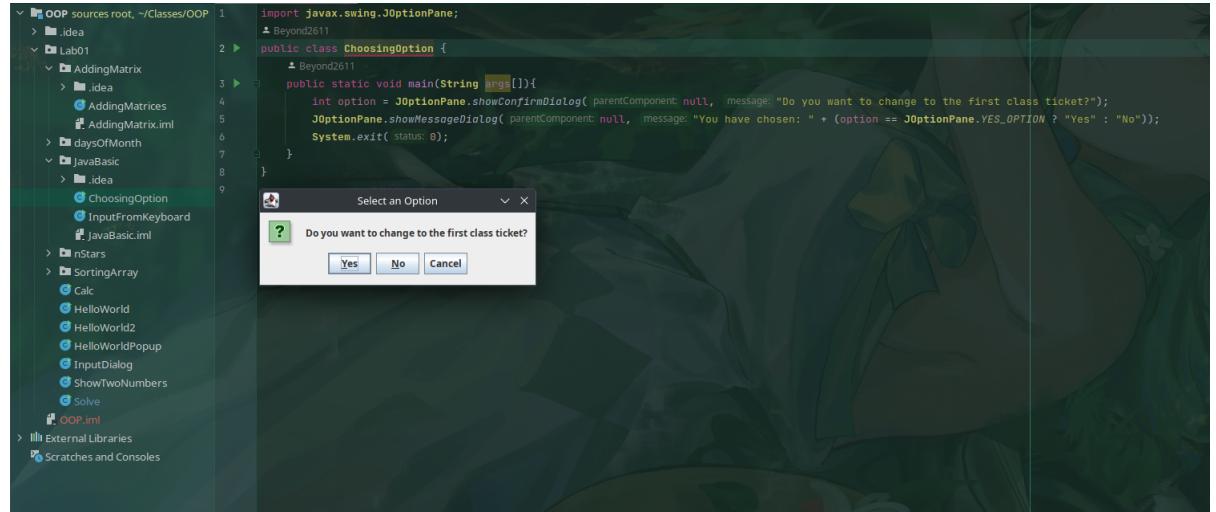
## 2 Java Project Exercises

6.1 Write and compile the ChoosingOption program:

```
1 import javax.swing.JOptionPane;
2 public class ChoosingOption{
3     public static void main(String[] args){
4         int option = JOptionPane.showConfirmDialog(null,
5             "Do you want to change to the first class ticket?");
6
7         JOptionPane.showMessageDialog(null,"You've chosen: "
8             + (option==JOptionPane.YES_OPTION?"Yes":"No"));
9         System.exit(0);
10    }
11 }
```

;

⇒ Source code:



- When you hit "Cancel", it will count as a negative choice so the "You have chosen: No" dialog will popup.
- Yes, by using the "option" parameters of the showOptionDialog with custom Option array. In this example, we can change the "Yes", "No" to "I Do" and "I don't" by using this code:

```

import javax.swing.JOptionPane;
public class ChoosingOption {
    public static void main(String
        args[]){
        Object[] options={"I do", "I
            don't"};
        int option =
            JOptionPane.showOptionDialog(null,
                "Do you want to change to the
                first class ticket?",
                "Confirmation",
                JOptionPane.DEFAULT_OPTION,

```

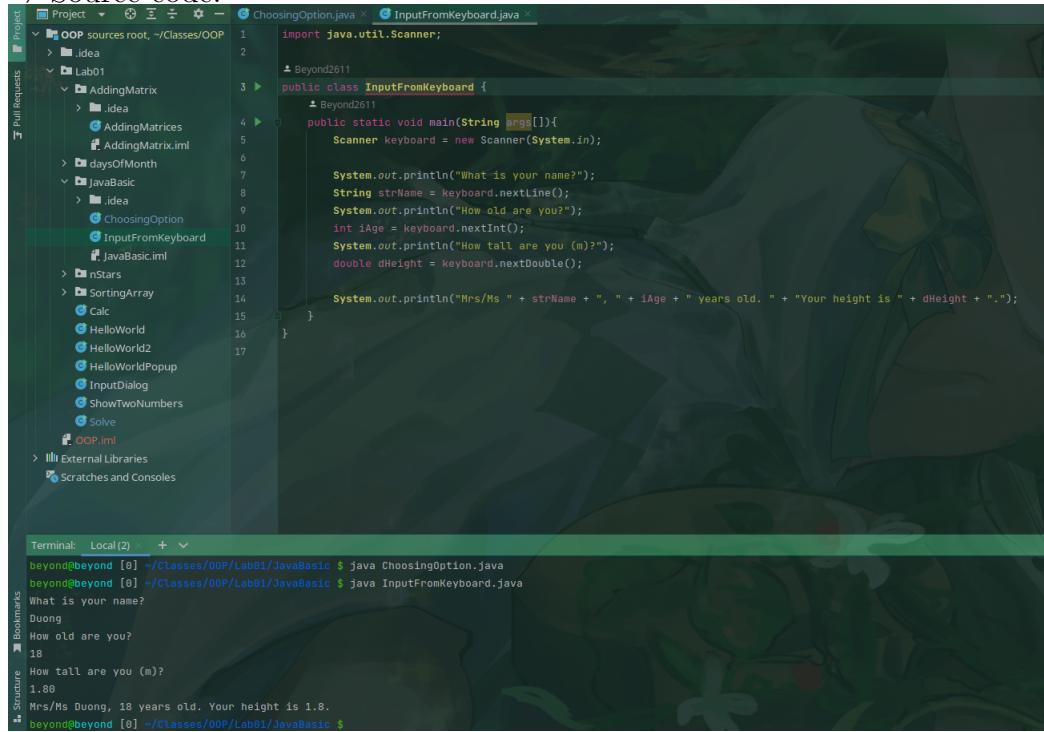
```

        JOptionPane.INFORMATION_MESSAGE ,
        null , options , options [0]);
JOptionPane.showMessageDialog(null ,
    "You have chosen: " + (option
    == JOptionPane.YES_OPTION ?
    "I Do" : "No"));
System.exit(0);
}
}

```

## 6.2 Write a program for input/output from keyboard.

⇒ Source code:



The screenshot shows an IDE interface with two tabs open: 'ChoosingOption.java' and 'InputFromKeyboard.java'. The 'InputFromKeyboard.java' tab is active, displaying the following code:

```

import java.util.Scanner;

public class InputFromKeyboard {
    public static void main(String args[]){
        Scanner keyboard = new Scanner(System.in);

        System.out.println("What is your name?");
        String strName = keyboard.nextLine();
        System.out.println("How old are you?");
        int iAge = keyboard.nextInt();
        System.out.println("How tall are you (m)?");
        double dHeight = keyboard.nextDouble();

        System.out.println("Mrs/Ms " + strName + ", " + iAge + " years old. " + "Your height is " + dHeight + ".");
    }
}

```

Below the code editor is a terminal window showing the execution of the program:

```

Terminal: Local(2) + ~
beyond@beyond [0] ~/Classes/OOP/Lab01/JavaBasic $ java ChoosingOption.java
beyond@beyond [0] ~/Classes/OOP/Lab01/JavaBasic $ java InputFromKeyboard.java
What is your name?
Duong
How old are you?
18
How tall are you (m)?
1.80
Mrs/Ms Duong, 18 years old. Your height is 1.8.
beyond@beyond [0] ~/Classes/OOP/Lab01/JavaBasic $

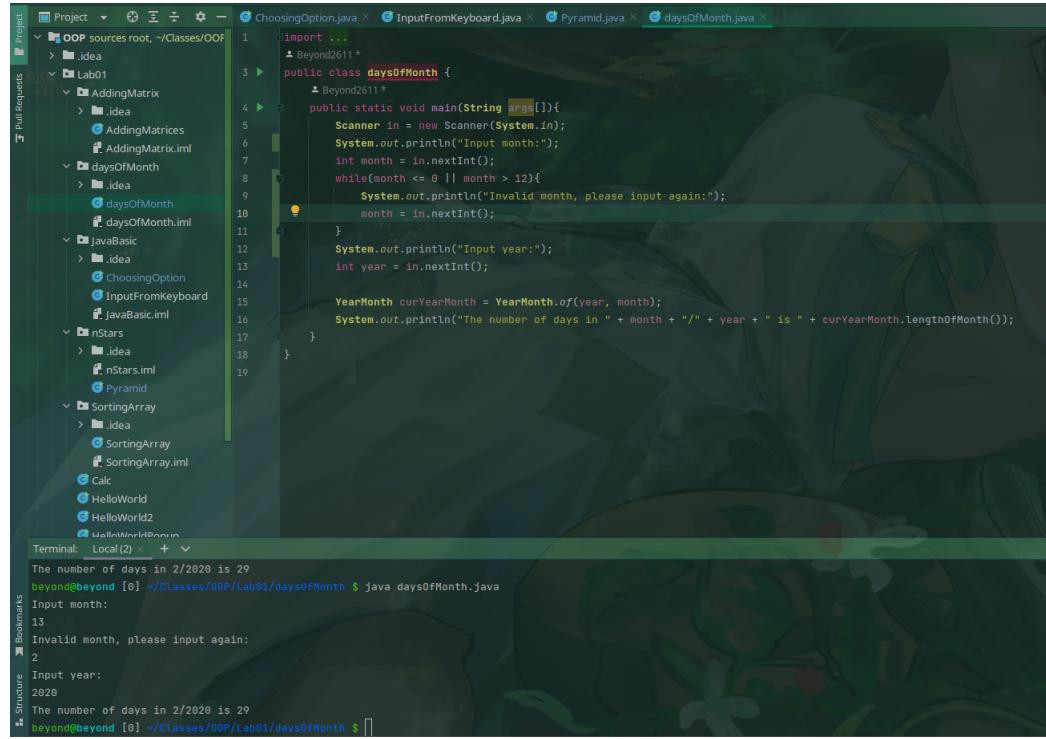
```

## 6.3 Write a program to display a triangle with a height of n stars (\*), n is entered by users.

⇒ Source code:

6.4 Write a program to display the number of days of a month, which is entered by users (both month and year). If it is an invalid month/year, ask the user to enter again..

⇒ Source code:



The screenshot shows the IntelliJ IDEA interface with the following details:

- Project Structure:** The left sidebar shows a project named "OOP sources root, ~/Classes/OOF" containing several packages like "Lab01", "AddingMatrix", "daysOfMonth", "JavaBasic", "nStars", and "SortingArray". Each package contains .idea files and Java source files (.java and .iml).
- Code Editor:** The main window displays the "daysOfMonth.java" file. The code is as follows:

```

import ...
public class daysOfMonth {
    public static void main(String args[]){
        Scanner in = new Scanner(System.in);
        System.out.println("Input month:");
        int month = in.nextInt();
        while(month <= 0 || month > 12){
            System.out.println("Invalid month, please input again:");
            month = in.nextInt();
        }
        System.out.println("Input year:");
        int year = in.nextInt();

        YearMonth curYearMonth = YearMonth.of(year, month);
        System.out.println("The number of days in " + month + "/" + year + " is " + curYearMonth.lengthOfMonth());
    }
}

```

- Terminal:** Below the editor, the terminal window shows the execution of the program:

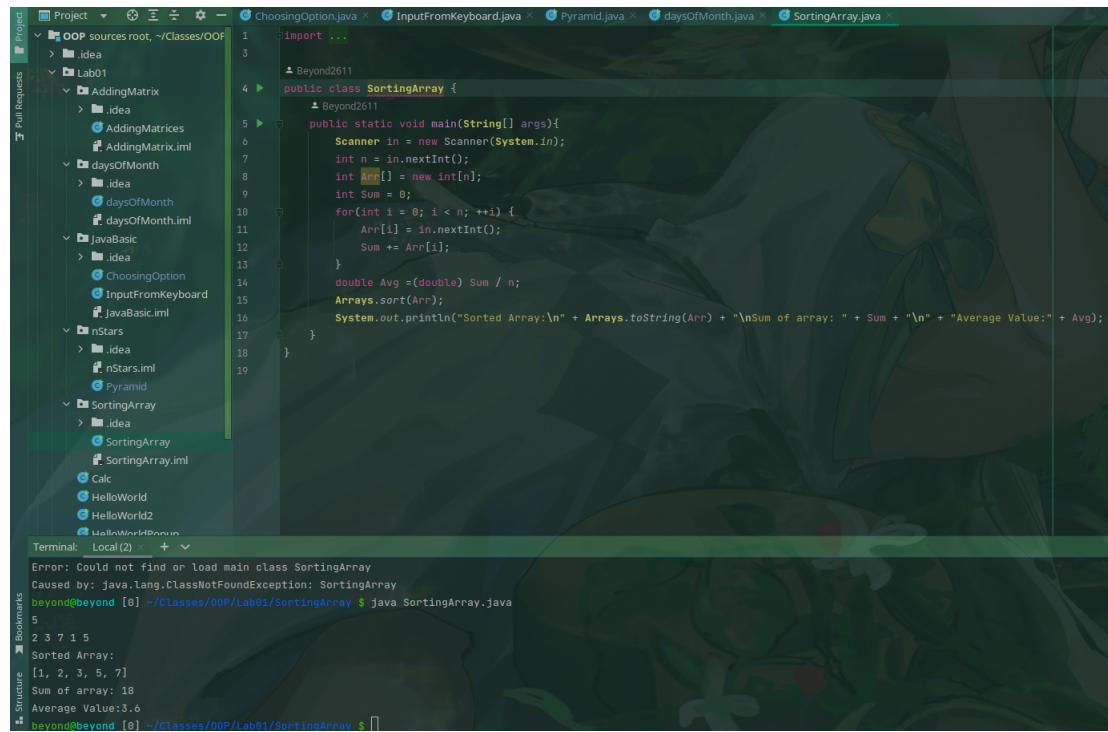
```

The number of days in 2/2020 is 29
beyond@beyond [8] ~/Classes/OOP/Lab01/daysOfMonth $ java daysOfMonth.java
Input month:
13
Invalid month, please input again:
2
Input year:
2020
The number of days in 2/2020 is 29
beyond@beyond [8] ~/Classes/OOP/Lab01/daysOfMonth $

```

## 6.5 Write a Java program to sort a numeric array, and calculate the sum and average value of array elements..

⇒ Source code:



```

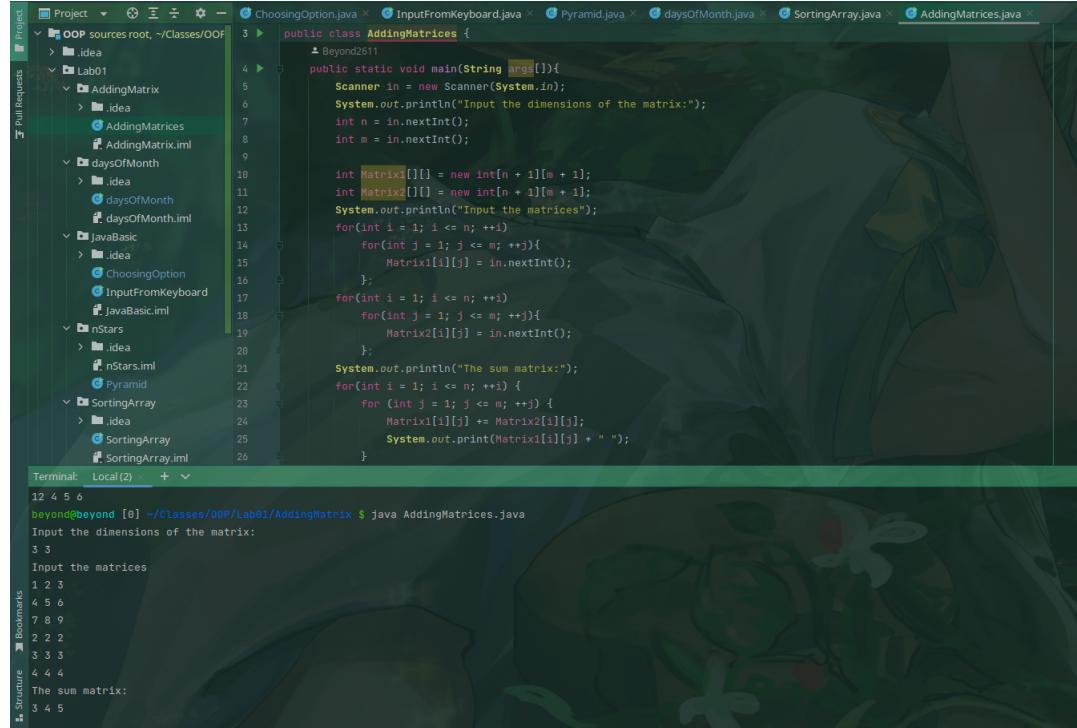
import ...
public class SortingArray {
    public static void main(String[] args){
        Scanner in = new Scanner(System.in);
        int n = in.nextInt();
        int Arr[] = new int[n];
        int Sum = 0;
        for(int i = 0; i < n; ++i) {
            Arr[i] = in.nextInt();
            Sum += Arr[i];
        }
        double Avg =(double) Sum / n;
        Arrays.sort(Arr);
        System.out.println("Sorted Array:\n" + Arrays.toString(Arr) + "\nSum of array: " + Sum + "\n" + "Average Value:" + Avg);
    }
}

```

Error: Could not find or load main class SortingArray  
Caused by: java.lang.ClassNotFoundException: SortingArray  
beyond@beyond [0] ~/Classes/OOP/Lab01/SortingArray \$ java SortingArray.java  
5  
2 3 7 1 5  
Sorted Array:  
[1, 2, 3, 5, 7]  
Sum of array: 18  
Average Value:3.6  
beyond@beyond [0] ~/Classes/OOP/Lab01/SortingArray \$

## 6.6 Write a Java program to add two matrices of the same size.

⇒ Source code:



```

public class AddingMatrices {
    public static void main(String args[]){
        Scanner in = new Scanner(System.in);
        System.out.println("Input the dimensions of the matrix:");
        int n = in.nextInt();
        int m = in.nextInt();

        int Matrix1[][] = new int[n + 1][m + 1];
        int Matrix2[][] = new int[n + 1][m + 1];
        System.out.println("Input the matrices");
        for(int i = 1; i <= n; ++i)
            for(int j = 1; j <= m; ++j)
                Matrix1[i][j] = in.nextInt();
        for(int i = 1; i <= n; ++i)
            for(int j = 1; j <= m; ++j)
                Matrix2[i][j] = in.nextInt();
        System.out.println("The sum matrix:");
        for(int i = 1; i <= n; ++i) {
            for (int j = 1; j <= m; ++j) {
                Matrix1[i][j] += Matrix2[i][j];
                System.out.print(Matrix1[i][j] + " ");
            }
        }
    }
}

```

12 4 5 6  
beyond@beyond [0] ~/Classes/OOP/Lab01/AddingMatrix \$ java AddingMatrices.java  
Input the dimensions of the matrix:  
3 3  
Input the matrices  
1 2 3  
4 5 6  
7 8 9  
2 2 2  
3 3 3  
4 4 4  
The sum matrix:  
3 4 5