BÁO CÁO THỰC HÀNH LAB 1

LẬP TRÌNH HƯỚNG ĐỐI TƯỢNG

2.2. The Very First Java Programs

2.2.1 Write, compile the first Java application

```java
package Lab01;

public class HelloWorld {
    public static void main(String[] args) {
        System.out.println("Xin chao \n cac ban!");
        System.out.println("Hello \n world!");
    }
}
```

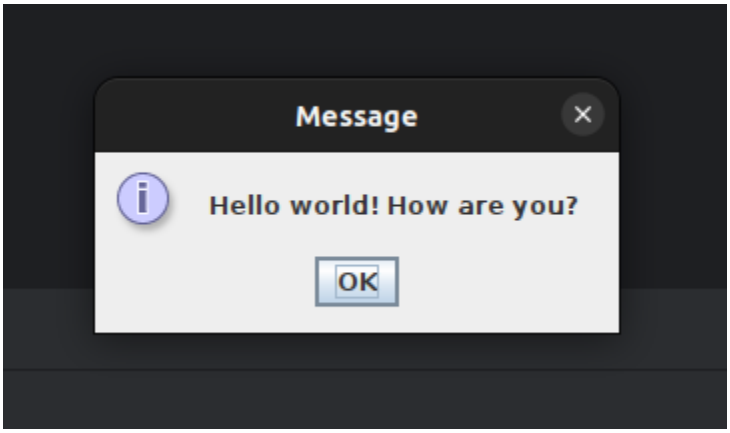
Kết quả:

```
/usr/lib/jvm/jdk-20/bin/java -javaagent:/home/vietanhvu/Downloads/id
Xin chao
 cac ban!
Hello
 world!

Process finished with exit code 0
```

2.2.2 Write, compile the first dialog Java program

```java
package Lab01;

import javax.swing.JOptionPane;

public class FirstDialog {
    public static void main(String[] args) {
        JOptionPane.showMessageDialog( parentComponent: null,  message: "Hello world! How are you?");
        System.exit( status: 0);
    }
}
```

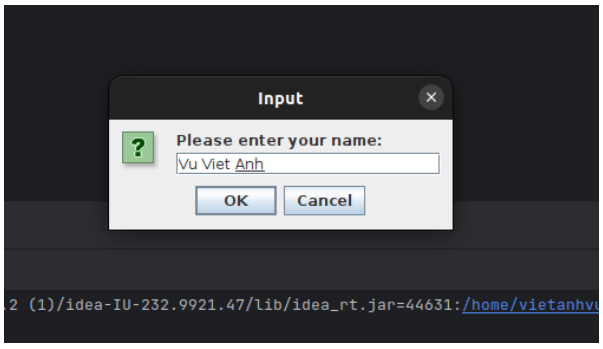
Kết quả

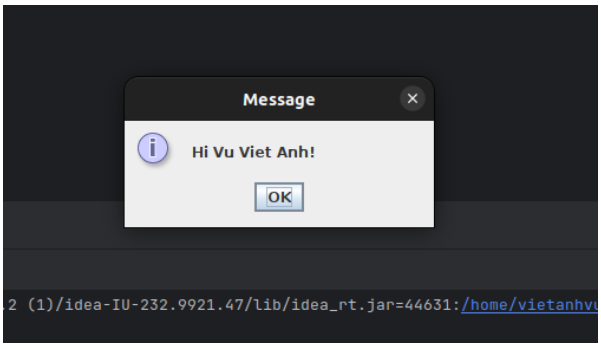


2.2.3 Write, compile the first input dialog Java application

```
package Lab01;

import javax.swing.JOptionPane;

public class HelloNameDialog {
    public static void main(String[] args) {
        String result;
        result = JOptionPane.showInputDialog("Please enter your name:");
        JOptionPane.showMessageDialog( parentComponent: null, message: "Hi " + result + "!");
        System.exit( status: 0);
    }
}
```

Kết quả

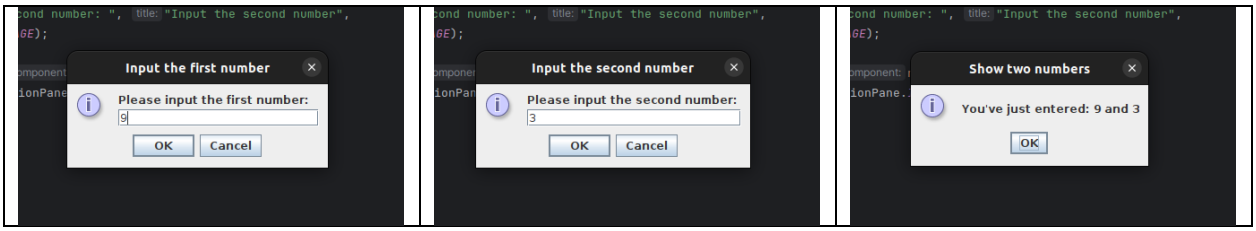




2.2.4 Write, compile, and run the following example

```java
package Lab01;

// Example 5: ShowTwoNumbers.java

import javax.swing.JOptionPane;

public class ShowTwoNumbers {
    public static void main(String[] args) {
        String strNum1, strNum2;
        String strNotification = "You've just entered: ";
        strNum1 = JOptionPane.showInputDialog( parentComponent: null,
                message: "Please input the first number: ", title: "Input the first number",
                JOptionPane.INFORMATION_MESSAGE);
        strNotification += strNum1 + " and ";
        strNum2 = JOptionPane.showInputDialog( parentComponent: null,
                message: "Please input the second number: ", title: "Input the second number",
                JOptionPane.INFORMATION_MESSAGE);
        strNotification += strNum2;
        JOptionPane.showMessageDialog( parentComponent: null, strNotification,
                title: "Show two numbers", JOptionPane.INFORMATION_MESSAGE);
        System.exit( status: 0);
    }
}
```

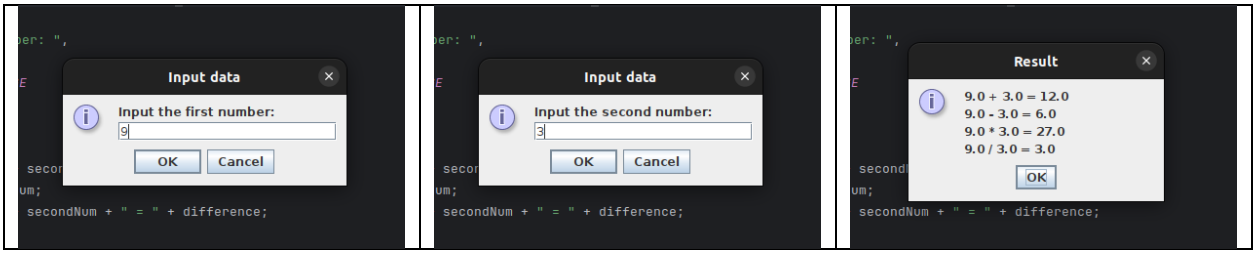
Kết quả



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

```java
package Lab01;

import javax.swing.JOptionPane;

public class CalculateTwoNumbers {
    public static void main(String[] args) {
        double firstNum;
        double secondNum;
        firstNum = Double.parseDouble(JOptionPane.showInputDialog(
                parentComponent: null,
                message: "Input the first number: ",
                title: "Input data",
                JOptionPane.INFORMATION_MESSAGE
        ));
        secondNum = Double.parseDouble(JOptionPane.showInputDialog(
                parentComponent: null,
                message: "Input the second number: ",
                title: "Input data",
                JOptionPane.INFORMATION_MESSAGE
        ));

        double sum = firstNum + secondNum;
        String sumMessage = firstNum + " + " + secondNum + " = " + sum;
        double difference = firstNum - secondNum;
        String difMessage = firstNum + " - " + secondNum + " = " + difference;
        double product = firstNum * secondNum;
        String productMessage = firstNum + " * " + secondNum + " = " + product;
        double quotient = firstNum / secondNum;
        String quotientMessage = firstNum + " / " + secondNum + " = " + quotient;

        JOptionPane.showMessageDialog(
                parentComponent: null,
                message: sumMessage + "\n" + difMessage + "\n" + productMessage + "\n" + quotientMessage + "\n",
                title: "Result", JOptionPane.INFORMATION_MESSAGE
        );

        System.exit( status: 0);
    }
}
```

Kết quả

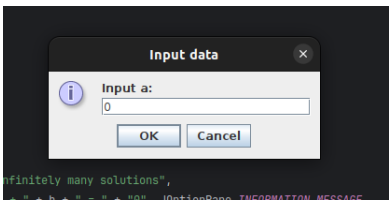


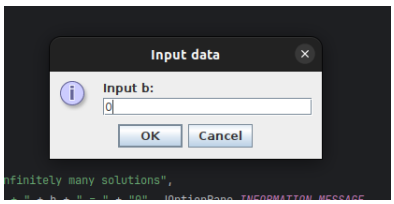
2.2.6 Write a program to solve:

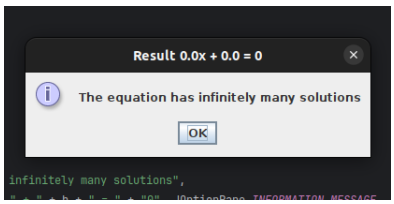
The first-degree equation (linear equation) with one variable

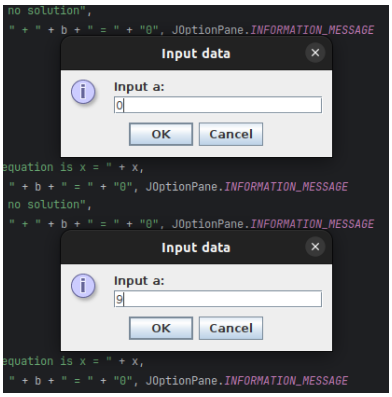
```java
package Lab01;

import javax.swing.*;

public class SolveLinearEquation {
    public static void main(String[] args) {
        double a;
        double b;
        a = Double.parseDouble(JOptionPane.showInputDialog(
                parentComponent: null,
                message: "Input a: ",
                title: "Input data",
                JOptionPane.INFORMATION_MESSAGE
        ));
        b = Double.parseDouble(JOptionPane.showInputDialog(
                parentComponent: null,
                message: "Input b: ",
                title: "Input data",
                JOptionPane.INFORMATION_MESSAGE
        ));

        if (a == 0) {
            if (b == 0) {
                JOptionPane.showMessageDialog(
                        parentComponent: null,
                        message: "The equation has infinitely many solutions",
                        title: "Result " + a + "x" + " + " + b + " = " + "0", JOptionPane.INFORMATION_MESSAGE
                );
            } else {
                JOptionPane.showMessageDialog(
                        parentComponent: null,
                        message: "The equation has no solution",
                        title: "Result " + a + "x" + " + " + b + " = " + "0", JOptionPane.INFORMATION_MESSAGE
                );
            }
        } else {
            double x = -b / a;
            JOptionPane.showMessageDialog(
                    parentComponent: null,
                    message: "The solution to the equation is x = " + x,
                    title: "Result " + a + "x" + " + " + b + " = " + "0", JOptionPane.INFORMATION_MESSAGE
            );
        }
    }
}
```

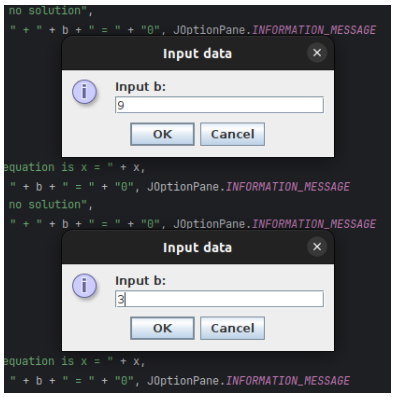
kết quả:

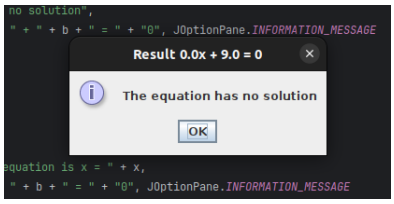


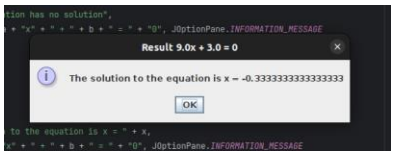




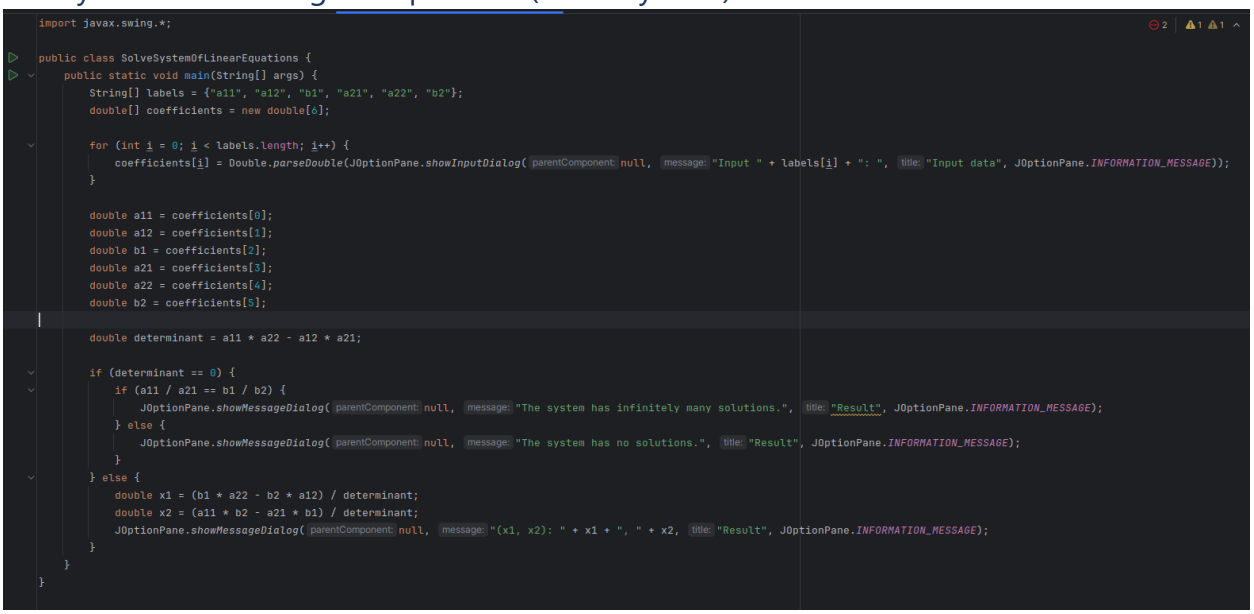






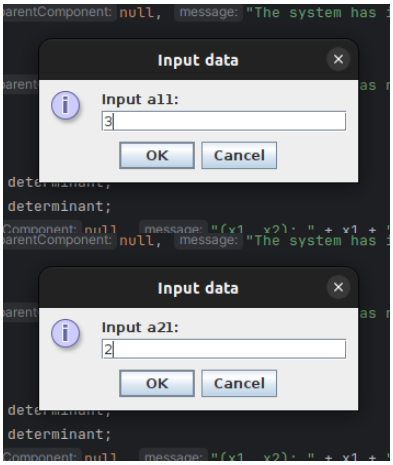


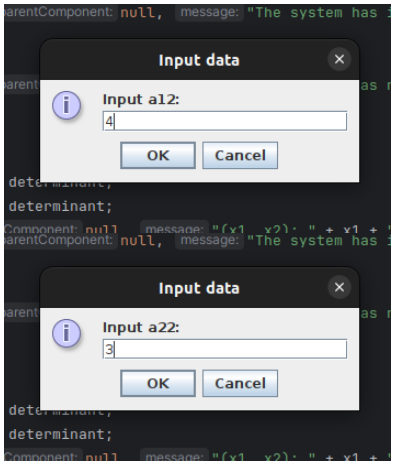
The system of first-degree equations (linear system) with two variables

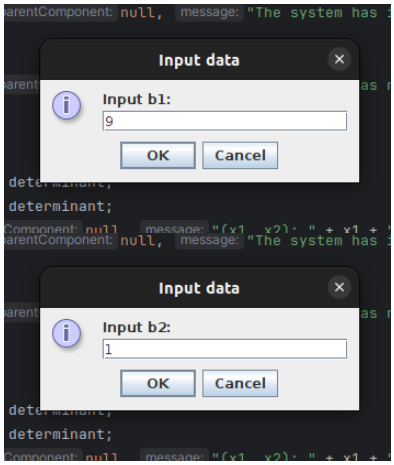


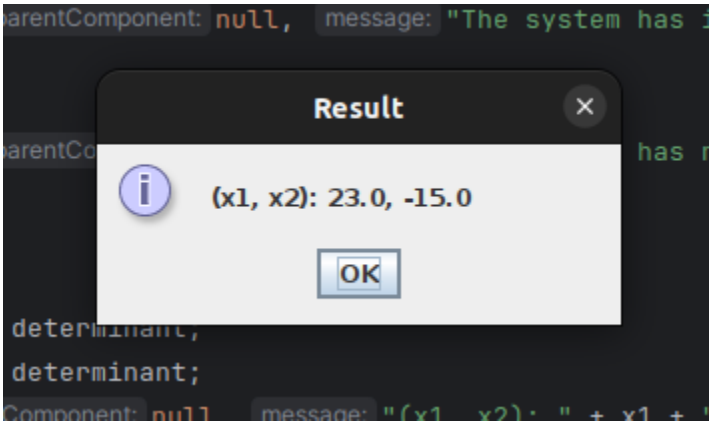
```
import javax.swing.*;

public class SolveSystemOfLinearEquations {
    public static void main(String[] args) {
        String[] labels = {"a11", "a12", "b1", "a21", "a22", "b2"};
        double[] coefficients = new double[6];

        for (int i = 0; i < labels.length; i++) {
            coefficients[i] = Double.parseDouble(JOptionPane.showInputDialog( parentComponent: null, message: "Input " + labels[i] + ": ", title: "Input data", JOptionPane.INFORMATION_MESSAGE));
        }

        double a11 = coefficients[0];
        double a12 = coefficients[1];
        double b1 = coefficients[2];
        double a21 = coefficients[3];
        double a22 = coefficients[4];
        double b2 = coefficients[5];

        double determinant = a11 * a22 - a12 * a21;

        if (determinant == 0) {
            if (a11 / a21 == b1 / b2) {
                JOptionPane.showMessageDialog( parentComponent: null, message: "The system has infinitely many solutions.", title: "Result", JOptionPane.INFORMATION_MESSAGE);
            } else {
                JOptionPane.showMessageDialog( parentComponent: null, message: "The system has no solutions.", title: "Result", JOptionPane.INFORMATION_MESSAGE);
            }
        } else {
            double x1 = (b1 * a22 - b2 * a12) / determinant;
            double x2 = (a11 * b2 - a21 * b1) / determinant;
            JOptionPane.showMessageDialog( parentComponent: null, message: "(x1, x2): " + x1 + ", " + x2, title: "Result", JOptionPane.INFORMATION_MESSAGE);
        }
    }
}
```

Kết quả:







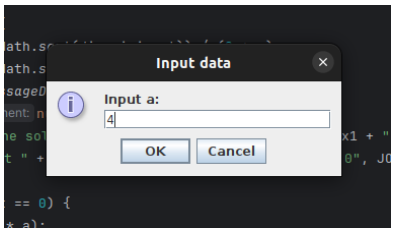


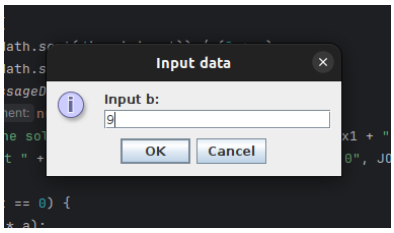
The second-degree equation with one variable

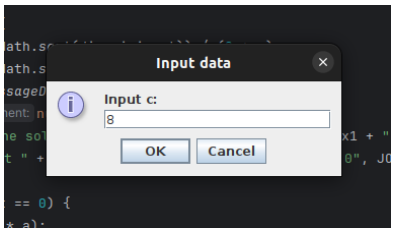
```java
package Lab01;

import javax.swing.*;

public class SolveQuadraticEquation {
    public static void main(String[] args) {
        double a;
        double b;
        double c;

        a = Double.parseDouble(JOptionPane.showInputDialog(
                parentComponent: null,
                message: "Input a: ",
                title: "Input data",
                JOptionPane.INFORMATION_MESSAGE
        ));
        b = Double.parseDouble(JOptionPane.showInputDialog(
                parentComponent: null,
                message: "Input b: ",
                title: "Input data",
                JOptionPane.INFORMATION_MESSAGE
        ));
        c = Double.parseDouble(JOptionPane.showInputDialog(
                parentComponent: null,
                message: "Input c: ",
                title: "Input data",
                JOptionPane.INFORMATION_MESSAGE
        ));

        if (a == 0) {
            if (b == 0) {
                if (c == 0) {
                    JOptionPane.showMessageDialog(
                            parentComponent: null,
                            message: "The equation has infinitely many solutions",
                            title: "Result " + a + "x^2 + " + b + "x + " + c + " = 0", JOptionPane.INFORMATION_MESSAGE
                    );
                } else {
                    JOptionPane.showMessageDialog(
                            parentComponent: null,
                            message: "The equation has no solution",
                            title: "Result " + a + "x^2 + " + b + "x + " + c + " = 0", JOptionPane.INFORMATION_MESSAGE
```

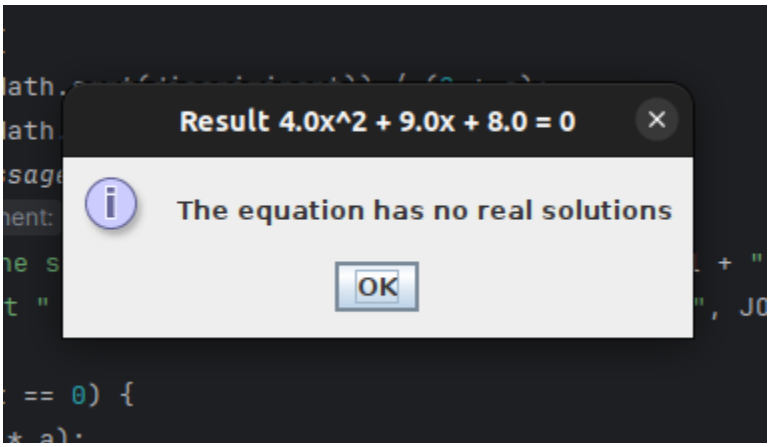
```
                        parentComponent: null,
                        message: "The equation has no solution",
                        title: "Result " + a + "x^2 + " + b + "x + " + c + " = 0", JOptionPane.INFORMATION_MESSAGE
                    );
                }
            } else {
                double x = -c / b;
                JOptionPane.showMessageDialog(
                        parentComponent: null,
                        message: "The solution to the equation is x = " + x,
                        title: "Result " + a + "x^2 + " + b + "x + " + c + " = 0", JOptionPane.INFORMATION_MESSAGE
                );
            }
        } else {
            double discriminant = b * b - 4 * a * c;

            if (discriminant > 0) {
                double x1 = (-b + Math.sqrt(discriminant)) / (2 * a);
                double x2 = (-b - Math.sqrt(discriminant)) / (2 * a);
                JOptionPane.showMessageDialog(
                        parentComponent: null,
                        message: "The solutions to the equation are x1 = " + x1 + " and x2 = " + x2,
                        title: "Result " + a + "x^2 + " + b + "x + " + c + " = 0", JOptionPane.INFORMATION_MESSAGE
                );
            } else if (discriminant == 0) {
                double x = -b / (2 * a);
                JOptionPane.showMessageDialog(
                        parentComponent: null,
                        message: "The solution to the equation is x = " + x,
                        title: "Result " + a + "x^2 + " + b + "x + " + c + " = 0", JOptionPane.INFORMATION_MESSAGE
                );
            } else {
                JOptionPane.showMessageDialog(
                        parentComponent: null,
                        message: "The equation has no real solutions",
                        title: "Result " + a + "x^2 + " + b + "x + " + c + " = 0", JOptionPane.INFORMATION_MESSAGE
                );
            }
        }
    }
}
```

Kết quả







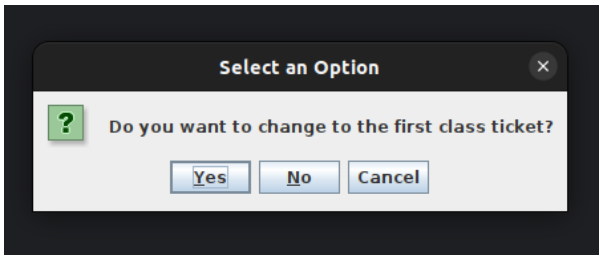


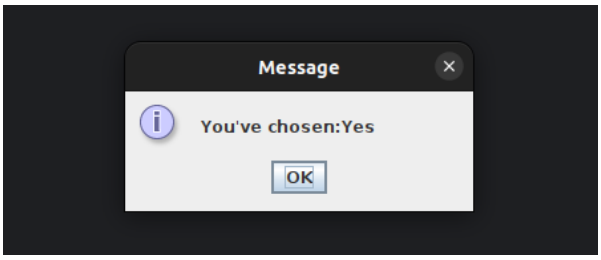
6. Exercises

6.1 Write, compile and run the ChoosingOption program:

```
package Lab01;
import javax.swing.JOptionPane;
public class ChoosingOption {
    public static void main(String[] args) {
        int option = JOptionPane.showConfirmDialog( parentComponent: null,
                message: "Do you want to change to the first class ticket?");

        JOptionPane.showMessageDialog( parentComponent: null, message: "You've chosen:"
                + (option==JOptionPane.YES_OPTION? "Yes": "No"));
        System.exit( status: 0);
    }
}
```

Kết quả





6.2. Write a program for input/output from keyboard

```java
package Lab01;

import java.util.Scanner;
public class InputFromKeyBoard{
    public static void main(String args[]){

        Scanner keyboard = new Scanner(System.in);
        System.out.println("What's 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 + " m.");

    }
}
```

Kết quả:

```
/usr/lib/jvm/jdk-20/bin/java -javaagent:/home/vietanhvu/Downloads/ide
What's your name?
Vu Viet Anh
How old are you?
20
How tall are you (m)?
1.7
Mrs/Ms.Vu Viet Anh,20 years old. Your height is 1.7 m.

Process finished with exit code 0
```

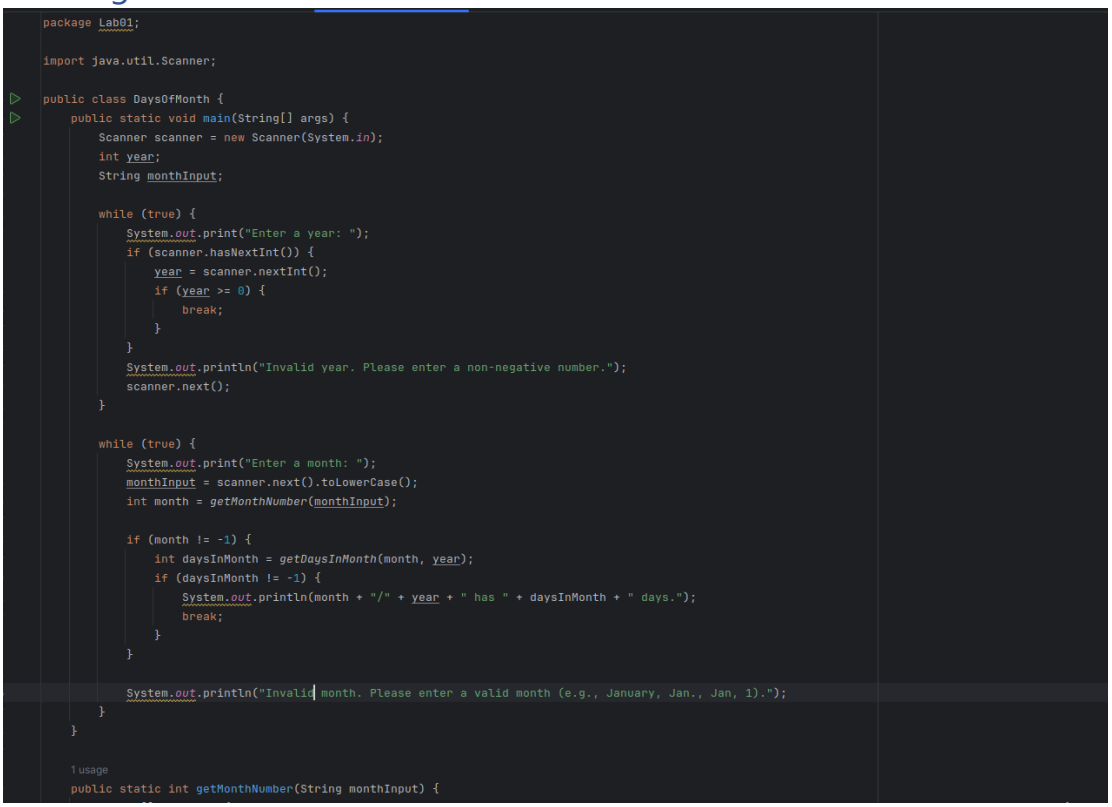
6.3 Write a program to display a triangle with a height of n stars (*), n is entered by users.

```java
package Lab01;

import java.util.Scanner;

public class TriangleStars {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);
        System.out.print("Enter the height of the triangle: ");
        int n = scanner.nextInt();

        for (int i = 1; i <= n; i++) {
            for (int j = 1; j <= n - i; j++) {
                System.out.print(" ");
            }

            for (int k = 1; k <= 2 * i - 1; k++) {
                System.out.print("*");
            }

            System.out.println();
        }
    }
}
```

Kết quả:

```
/usr/lib/jvm/jdk-20/bin/java -javaagent:/home/v
Enter the height of the triangle: 9
         *
        ***
       *****
      *******
     *********
    ***********
   *************
  ***************
*****************

Process finished with exit code 0
```

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.



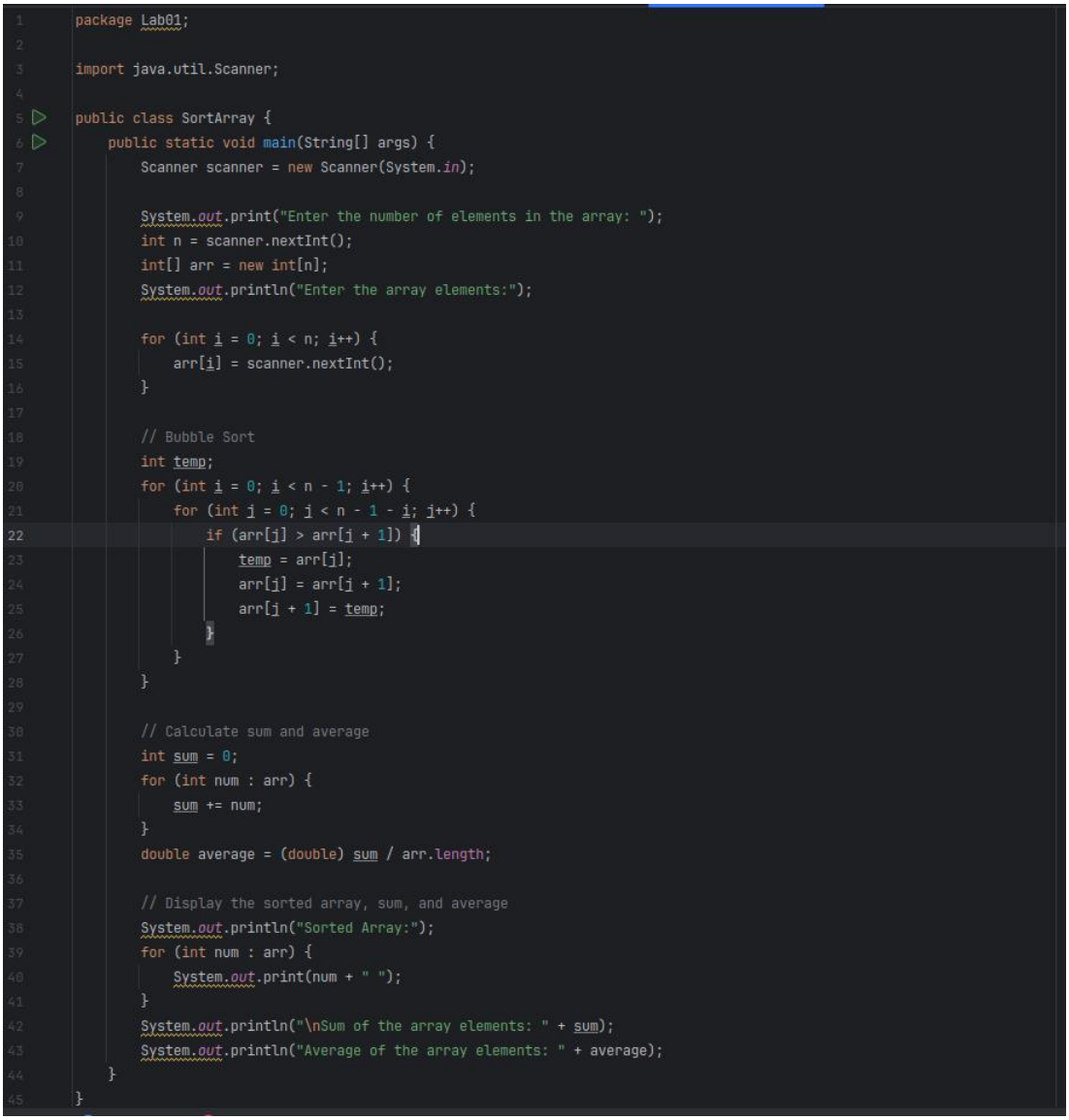
```java
package Lab01;

import java.util.Scanner;

public class DaysOfMonth {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);
        int year;
        String monthInput;

        while (true) {
            System.out.print("Enter a year: ");
            if (scanner.hasNextInt()) {
                year = scanner.nextInt();
                if (year >= 0) {
                    break;
                }
            }
            System.out.println("Invalid year. Please enter a non-negative number.");
            scanner.next();
        }

        while (true) {
            System.out.print("Enter a month: ");
            monthInput = scanner.next().toLowerCase();
            int month = getMonthNumber(monthInput);

            if (month != -1) {
                int daysInMonth = getDaysInMonth(month, year);
                if (daysInMonth != -1) {
                    System.out.println(month + "/" + year + " has " + daysInMonth + " days.");
                    break;
                }
            }

            System.out.println("Invalid month. Please enter a valid month (e.g., January, Jan., Jan, 1).");
        }
    }

    1 usage
    public static int getMonthNumber(String monthInput) {
```

```
            }

            System.out.println("Invalid month. Please enter a valid month (e.g., January, Jan., Jan, 1).");
        }
    }

    1 usage
    public static int getMonthNumber(String monthInput) {
        String[] months = {"january", "february", "march", "april", "may", "june", "july", "august", "september", "october", "november", "december"};
        String[] monthAbbreviations = {"jan.", "feb.", "mar.", "apr.", "may", "jun.", "jul.", "aug.", "sep.", "oct.", "nov.", "dec."};
        String[] monthShortNames = {"jan", "feb", "mar", "apr", "may", "jun", "jul", "aug", "sep", "oct", "nov", "dec"};

        for (int i = 0; i < months.length; i++) {
            boolean isMonth = months[i].equals(monthInput);
            boolean isAbbreviation = monthAbbreviations[i].equals(monthInput);
            boolean isShortName = monthShortNames[i].equals(monthInput);
            boolean isNumName = String.valueOf( i + 1).equals(monthInput);
            if (isMonth || isAbbreviation || isShortName || isNumName) {
                return i + 1;
            }
        }
        return -1;
    }

    1 usage
    public static int getDaysInMonth(int month, int year) {
        switch (month) {
            case 1, 3, 5, 7, 8, 10, 12:
                return 31;
            case 4, 6, 9, 11:
                return 30;
            case 2:
                if ((year % 4 == 0 && year % 100 != 0) || (year % 400 == 0)) return 29;
                else return 28;
            default:
                System.out.println("Invalid Month.");
        }
        return 0;
    }

}
```

Kết quả

```
/usr/lib/jvm/jdk-20/bin/java -javaagent:/home/vietanhvu/Downloads/ideaIU-2023.2.2
Enter a year: fasf
Invalid year. Please enter a non-negative number.
Enter a year: 2003
Enter a month: fad
Invalid month. Please enter a valid month (e.g., January, Jan., Jan, 1).
Enter a month: Jan.
1/2003 has 31 days.

Process finished with exit code 0
```

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



```java
package Lab01;

import java.util.Scanner;

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

        System.out.print("Enter the number of elements in the array: ");
        int n = scanner.nextInt();
        int[] arr = new int[n];
        System.out.println("Enter the array elements:");

        for (int i = 0; i < n; i++) {
            arr[i] = scanner.nextInt();
        }

        // Bubble Sort
        int temp;
        for (int i = 0; i < n - 1; i++) {
            for (int j = 0; j < n - 1 - i; j++) {
                if (arr[j] > arr[j + 1]) {
                    temp = arr[j];
                    arr[j] = arr[j + 1];
                    arr[j + 1] = temp;
                }
            }
        }

        // Calculate sum and average
        int sum = 0;
        for (int num : arr) {
            sum += num;
        }
        double average = (double) sum / arr.length;

        // Display the sorted array, sum, and average
        System.out.println("Sorted Array:");
        for (int num : arr) {
            System.out.print(num + " ");
        }
        System.out.println("\nSum of the array elements: " + sum);
        System.out.println("Average of the array elements: " + average);
    }
}
```

Kết quả

```
/usr/lib/jvm/jdk-20/bin/java -javaagent:/home/vietanhvu/Downloads/ideaIU-2023.2.2
Enter the number of elements in the array: 10
Enter the array elements:
2
4
3
1
7
6
5
8
9
10
Sorted Array:
1 2 3 4 5 6 7 8 9 10
Sum of the array elements: 55
Average of the array elements: 5.5

Process finished with exit code 0
```

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

```java
package Lab01;

import java.util.Scanner;

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

        System.out.print("Enter the number of rows of the matrix: ");
        int rows = input.nextInt();
        System.out.print("Enter the number of columns of the matrix: ");
        int columns = input.nextInt();

        int[][] matrix1 = new int[rows][columns];
        int[][] matrix2 = new int[rows][columns];

        System.out.println("Enter the first matrix:");
        inputMatrix(matrix1, input);

        System.out.println("Enter the second matrix:");
        inputMatrix(matrix2, input);

        int[][] sumMatrix = new int[rows][columns];

        // Perform matrix addition
        for (int i = 0; i < rows; i++) {
            for (int j = 0; j < columns; j++) {
                sumMatrix[i][j] = matrix1[i][j] + matrix2[i][j];
            }
        }

        // Print the result matrix
        System.out.println("First matrix:");
        printMatrix(matrix1);

        System.out.println("Second matrix:");
        printMatrix(matrix2);

        System.out.println("Sum of the two matrices:");
        printMatrix(sumMatrix);

        input.close();
    }
```

```
                sumMatrix[i][j] = matrix1[i][j] + matrix2[i][j];
            }
        }

        // Print the result matrix
        System.out.println("First matrix:");
        printMatrix(matrix1);

        System.out.println("Second matrix:");
        printMatrix(matrix2);

        System.out.println("Sum of the two matrices:");
        printMatrix(sumMatrix);

        input.close();
    }

    2 usages
    public static void inputMatrix(int[][] matrix, Scanner input) {
        for (int i = 0; i < matrix.length; i++) {
            for (int j = 0; j < matrix[0].length; j++) {
                matrix[i][j] = input.nextInt();
            }
        }
    }

    3 usages
    public static void printMatrix(int[][] matrix) {
        for (int i = 0; i < matrix.length; i++) {
            for (int j = 0; j < matrix[0].length; j++) {
                System.out.print(matrix[i][j] + " ");
            }
            System.out.println();
        }
    }
}
```

Kết quả

```
/usr/lib/jvm/jdk-20/bin/java -javaagent:/home/vietanhvu/Downloads/ideaI
Enter the number of rows of the matrix: 3
Enter the number of columns of the matrix: 3
Enter the first matrix:
1 2 3
4 5 6
7 8 9
Enter the second matrix:
10 11 12
13 14 15
16 17 18
First matrix:
1 2 3
4 5 6
7 8 9
Second matrix:
10 11 12
13 14 15
16 17 18
Sum of the two matrices:
11 13 15
17 19 21
23 25 27

Process finished with exit code 0
```