

BÁO CÁO THỰC HÀNH LAP 1

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The Very First Java Programs

2.2.1 Write, 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 }
```

Kết quả

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

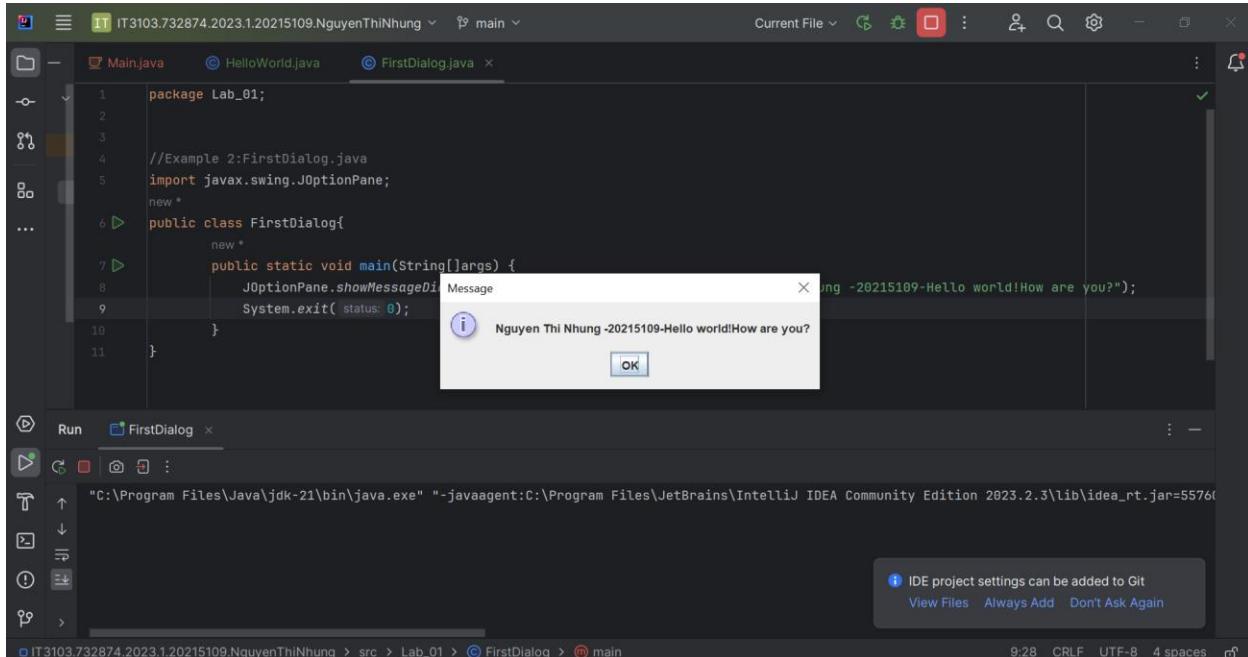
- Code Editor:** Displays two files: Main.java and HelloWorld.java. Main.java contains a package declaration and imports. HelloWorld.java contains the Hello World program.
- Run Tab:** Shows the output of the application. The output window displays the following text:


```
Nguyen Thi Nhung - 20215109
Xin chao
cac ban!
Hello    world!
```
- Status Bar:** Shows the file path (IT3103.732874.2023.1.20215109.NguyenThiNhung), encoding (UTF-8), and line count (11:2).

2.2.2 Write, compile the first dialog Java program

```

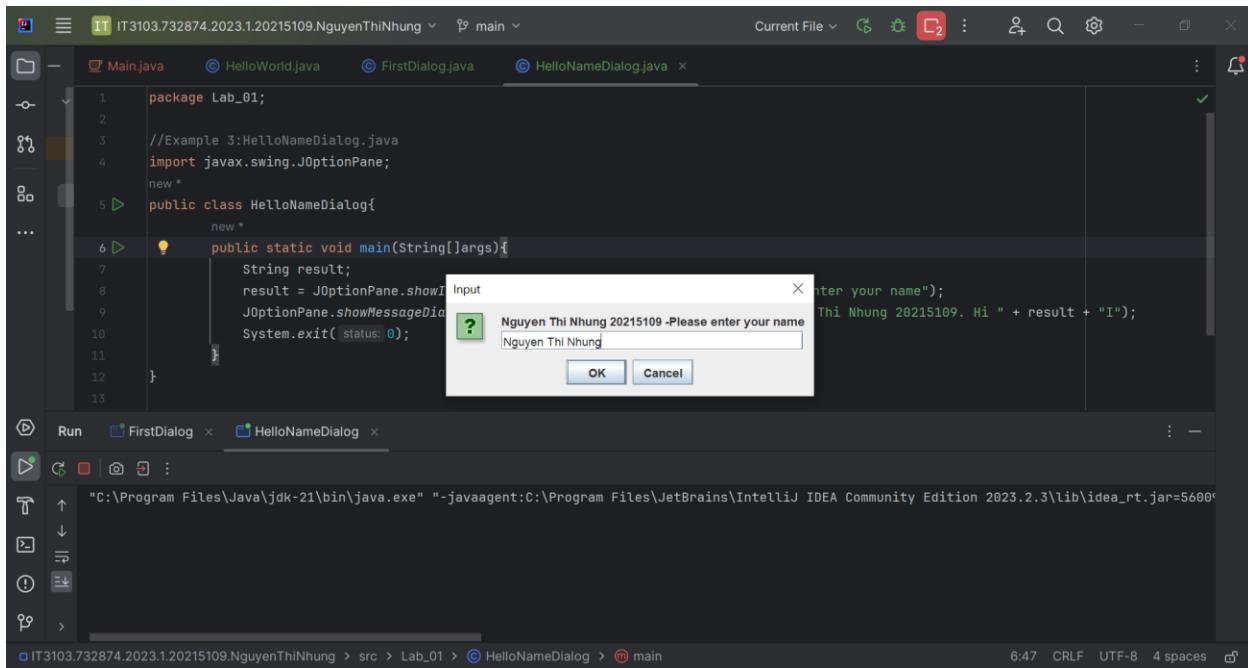
1 // Example 2: FirstDialog.java
2 import javax.swing.JOptionPane;
3 public class FirstDialog{
4     public static void main(String[] args){
5         JOptionPane.showMessageDialog(null,"Hello world! How are you?");
6         System.exit(0);
7     }
8 }
```



2.2.3 Write, compile the first input dialog Java application

```

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 }
```



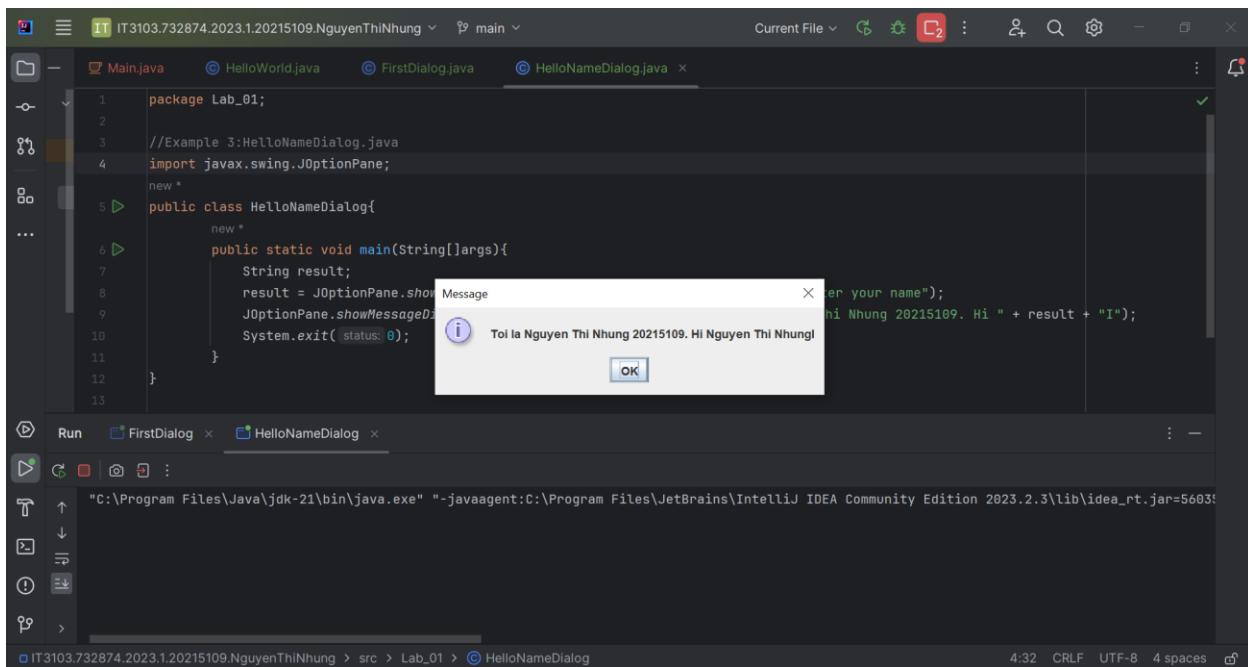
Screenshot of IntelliJ IDEA showing Java code for a JOptionPane dialog. The code is as follows:

```

1 package Lab_01;
2
3 //Example 3:HelloNameDialog.java
4 import javax.swing.JOptionPane;
5 new *
6 public class HelloNameDialog{
7     new *
8         public static void main(String[]args){
9             String result;
10            result = JOptionPane.showInputDialog("Enter your name");
11            JOptionPane.showMessageDialog(null, "Hi " + result + "!");
12        }
13    }

```

The application is running and a JOptionPane dialog is displayed, asking for the user's name. The input field contains "Nguyen Thi Nhung". The message box displays the output: "Hi Nguyen Thi Nhung".



Screenshot of IntelliJ IDEA showing Java code for a JOptionPane dialog. The code is identical to the one above:

```

1 package Lab_01;
2
3 //Example 3:HelloNameDialog.java
4 import javax.swing.JOptionPane;
5 new *
6 public class HelloNameDialog{
7     new *
8         public static void main(String[]args){
9             String result;
10            result = JOptionPane.showInputDialog("Enter your name");
11            JOptionPane.showMessageDialog(null, "Hi " + result + "!");
12        }
13    }

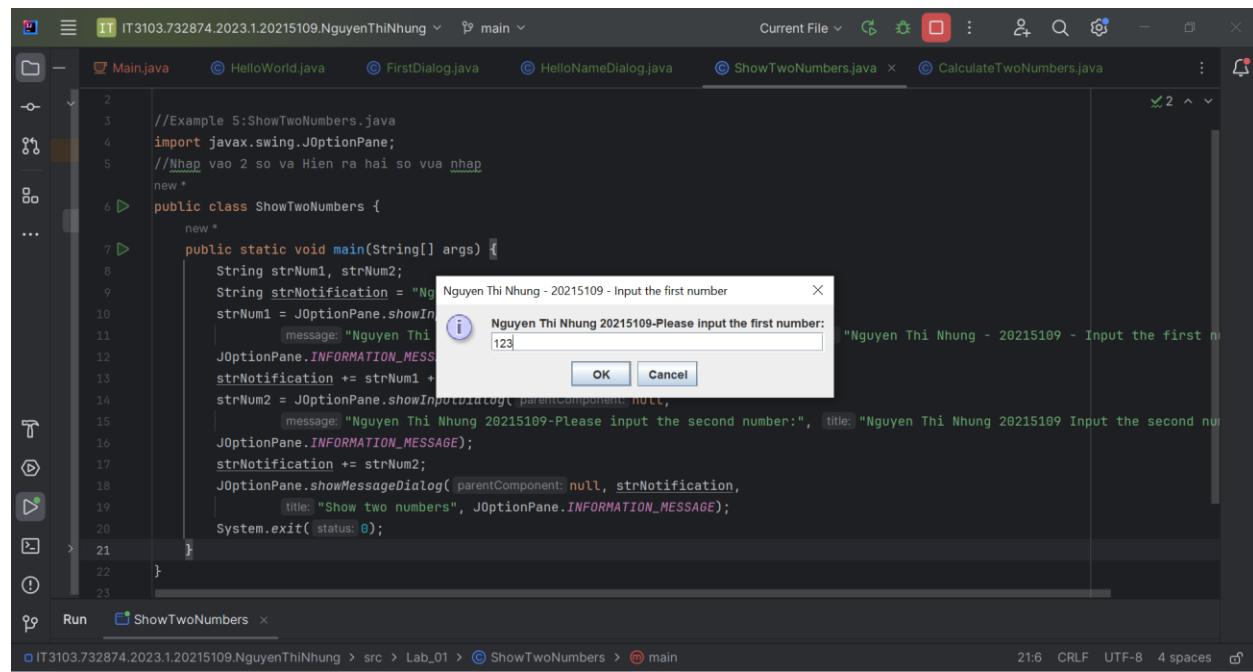
```

The application is running and a JOptionPane dialog is displayed, asking for the user's name. The input field contains "Toi la Nguyen Thi Nhung". The message box displays the output: "Hi Nguyen Thi Nhung".

2.2.4 Write, compile, and run 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 }
```



```

2 //Example 5:ShowTwoNumbers.java
3 import javax.swing.JOptionPane;
4 //Nhập vào 2 số và hiện ra hai số vừa nhập
5 new "
6 public class ShowTwoNumbers {
7     new "
8     public static void main(String[] args) {
9         String strNum1, strNum2;
10        String strNotification = "Nguyen Thi Nhungh 20215109 Input the second number";
11        strNum1 = JOptionPane.showInputDialog(null, message: "Nguyen Thi Nhungh 20215109-Pleas input the second number:", title: "Nguyen Thi Nhungh 20215109 - Input the first number", JOptionPANE.INFORMATION_MESSAGE);
12        strNotification += strNum1;
13        strNum2 = JOptionPane.showInputDialog(null, message: "Nguyen Thi Nhungh 20215109-Please input the second number:", title: "Nguyen Thi Nhungh 20215109 Input the second number", JOptionPANE.INFORMATION_MESSAGE);
14        strNotification += strNum2;
15        JOptionPane.showMessageDialog( parentComponent: null, strNotification,
16            title: "Show two numbers", JOptionPANE.INFORMATION_MESSAGE);
17        System.exit(status: 0);
18    }
19 }
20
21 }
```

The screenshot shows an IDE interface with several Java files listed in the sidebar: Main.java, HelloWorld.java, FirstDialog.java, HelloNameDialog.java, ShowTwoNumbers.java, and CalculateTwoNumbers.java. The main.java file is the current file, showing its code. A modal dialog box is displayed in the center of the screen, titled 'Nguyen Thi Nhungh 20215109 Input the second number'. It contains the message 'Nguyen Thi Nhungh 20215109-Pleas input the second number:', a text input field containing '45', and two buttons: 'OK' and 'Cancel'. The status bar at the bottom right indicates the time as 21:6, file encoding as CRLF, and character width as 4 spaces.

```

2 //Example 5:ShowTwoNumbers.java
3 import javax.swing.JOptionPane;
4 //Nhập vào 2 số và hiện ra hai số vừa nhập
5 new "
6 public class ShowTwoNumbers {
7     new "
8     public static void main(String[] args) {
9         String strNum1, strNum2;
10        String strNotification = "Nguyen Thi Nhungh 20215109 You've just entered: 123 and 45";
11        strNum1 = JOptionPane.showInputDialog(null, message: "Nguyen Thi Nhungh 20215109-Please input the first number:", title: "Nguyen Thi Nhungh 20215109 - Input the first number", JOptionPANE.INFORMATION_MESSAGE);
12        strNotification += strNum1 + " ";
13        strNum2 = JOptionPane.showInputDialog(null, message: "Nguyen Thi Nhungh 20215109-Please input the second number:", title: "Nguyen Thi Nhungh 20215109 Input the second number", JOptionPANE.INFORMATION_MESSAGE);
14        strNotification += strNum2;
15        JOptionPane.showMessageDialog( parentComponent: null, strNotification,
16            title: "Show two numbers", JOptionPANE.INFORMATION_MESSAGE);
17        System.exit(status: 0);
18    }
19 }
20
21 }
```

This screenshot shows the same IDE environment. The dialog box from the previous screenshot has been updated to display the message 'Nguyen Thi Nhungh 20215109 You've just entered: 123 and 45'. The status bar at the bottom right shows the time as 21:6, file encoding as CRLF, and character width as 4 spaces.

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

Notes

- To convert from String to double, you can use
 `double num1 = Double.parseDouble(strNum1)`
- Check the divisor of the division

```

public static void main(String[] args) {
    String strNum1, strNum2;
    strNum1 = JOptionPane.showInputDialog( parentComponent: null,
        message: "Nguyễn Thị Nhưng 20215109-Please input the first number:",
        title: "Nguyễn Thị Nhưng - 20215109 - Input the first number",
        JOptionPane.INFORMATION_MESSAGE);
    double num1 = Double.parseDouble(strNum1);
    strNum2 = JOptionPane.showInputDialog( parentComponent: null,
        message: "Nguyễn Thị Nhưng 20215109-Please input the second number:",
        title: "Nguyễn Thị Nhưng - 20215109 - Input the second number",
        JOptionPane.INFORMATION_MESSAGE);
    double num2 = Double.parseDouble(strNum2);

    double sum = num1 + num2;
    double diff = num1 - num2;
    double product = num1 * num2;
    double quotient = num1 / num2;

    String strNotification = "Nguyễn Thị Nhưng 20215109\nSum: " + num1 + " + " + num2 + " = " + sum +
        "\nDifference: " + num1 + " - " + num2 + " = " + diff +
        "\nProduct: " + num1 + " * " + num2 + " = " + product +
        "\nQuotient: " + num1 + " / " + num2 + " = " + quotient;
    JOptionPane.showMessageDialog( parentComponent: null, strNotification,
        title: "Show calculations", JOptionPane.INFORMATION_MESSAGE);
}

```

The Java application is running and displays a modal input dialog box titled "Nguyễn Thị Nhưng - 20215109 - Input the first number". The input field contains the value "30".

```

public static void main(String[] args) {
    String strNum1, strNum2;
    strNum1 = JOptionPane.showInputDialog( parentComponent: null,
        message: "Nguyễn Thị Nhưng 20215109-Please input the first number:",
        title: "Nguyễn Thị Nhưng - 20215109 - Input the first number",
        JOptionPane.INFORMATION_MESSAGE);
    double num1 = Double.parseDouble(strNum1);
    strNum2 = JOptionPane.showInputDialog( parentComponent: null,
        message: "Nguyễn Thị Nhưng 20215109-Please input the second number:",
        title: "Nguyễn Thị Nhưng - 20215109 - Input the second number"
        JOptionPane.INFORMATION_MESSAGE);
    double num2 = Double.parseDouble(strNum2);
    double sum = num1 + num2;
    double diff = num1 - num2;
    double product = num1 * num2;
    double quotient = num1 / num2;

    String strNotification = "Nguyễn Thị Nhưng 20215109\nSum: " + num1 + " + " + num2 + " = " + sum +
        "\nDifferent: " + num1 + " - " + num2 + " = " + diff +
        "\nProduct: " + num1 + " * " + num2 + " = " + product +
        "\nQuotient: " + num1 + " / " + num2 + " = " + quotient;
    JOptionPane.showMessageDialog( parentComponent: null, strNotification,
        title: "Show calculations", JOptionPane.INFORMATION_MESSAGE);
}

```

2.2.6 Write a program to solve the equation:

```

1  package Lab_01;
2  import javax.swing.*;
3  import java.util.Scanner;
4
5  public class EquationSolver {
6      public static void main(String[] args) {
7          Scanner scanner = new Scanner(System.in);
8          String choice = JOptionPane.showInputDialog( parentComponent: null,
9              message: "Nguyen Thi Nhung 20215109 - Please select the type of equation to solve:" +
10                 "\n1. First-degree equation (linear equation) with one variable" +
11                 "\n2. System of first-degree equations (linear system) with two variables" +
12                 "\n3. Second-degree equation (quadratic equation) with one variable",
13              title: "Nguyen Thi Nhung 20215109 - Select the type of equation ",
14              JOptionPane.INFORMATION_MESSAGE);
15
16
17      switch (choice) {
18          case "1":
19              solveLinearEquation(scanner);
20              break;
21          case "2":
22              solveLinearSystem(scanner);
23              break;
24          case "3":
25              solveQuadraticEquation(scanner);
26              break;
27          default:
28              System.out.println("Invalid choice");
29              break;
30      }
31
32      System.exit( status: 0 );
33  }
34
35  public static void solveLinearEquation(Scanner scanner) {
36      String strNum1, strNum2;
37      strNum1 = JOptionPane.showInputDialog( parentComponent: null,
38              message: "Nguyen Thi Nhung 20215109 - Equation: ax + b = 0" +
39                 "\nPlease input the coefficient 'a' for the linear equation:",
40              title: "Nguyen Thi Nhung 20215109 - Input the coefficient 'a' ",
41              JOptionPane.INFORMATION_MESSAGE);
42      double a = Double.parseDouble(strNum1);
43      strNum2 = JOptionPane.showInputDialog( parentComponent: null,
44              message: "Nguyen Thi Nhung 20215109 - Equation: ax + b = 0" +

```

```

45             "\nPlease input the coefficient 'b' for the linear equation:",
46             title: "Nguyễn Thị Nhung 20215109 - Input the coefficient 'b' ",
47             JOptionPane.INFORMATION_MESSAGE);
48         double b = Double.parseDouble(strNum2);
49
50         String strNotification = "Nguyễn Thị Nhung 20215109 - Equation: " + a + " x + " + b + " = 0 ";
51         if (a == 0) {
52             if (b == 0) {
53                 strNotification += "\nInfinite solutions";
54             } else {
55                 strNotification += "\nNo solution";
56             }
57         } else {
58             double solution = -b / a;
59             strNotification += "\nSolution: x = " + solution;
60         }
61         JOptionPane.showMessageDialog( parentComponent: null, strNotification,
62             title: "Show Solution", JOptionPane.INFORMATION_MESSAGE);
63     }
64
65     1 usage ▲ nhungngn
66     public static void solveLinearSystem(Scanner scanner) {
67         String strNum1, strNum2, strNum3, strNum4, strNum5, strNum6;
68         strNum1 = JOptionPane.showInputDialog( parentComponent: null,
69             message: "Nguyễn Thị Nhung 20215109 \nEquation: a11x1 + a12x2 = b1; a21x1 + a22x2 = b2" +
70             "\nPlease input the coefficient 'a11' for equation 1:",
71             title: "Nguyễn Thị Nhung 20215109 - Input the coefficient 'a11' ",
72             JOptionPane.INFORMATION_MESSAGE);
73         double a11 = Double.parseDouble(strNum1);
74         strNum2 = JOptionPane.showInputDialog( parentComponent: null,
75             message: "Nguyễn Thị Nhung 20215109 \nEquation: a11x1 + a12x2 = b1; a21x1 + a22x2 = b2" +
76             "\nPlease input the coefficient 'a12' for equation 1:",
77             title: "Nguyễn Thị Nhung 20215109 - Input the coefficient 'a12' ",
78             JOptionPane.INFORMATION_MESSAGE);
79         double a12 = Double.parseDouble(strNum2);
80         strNum3 = JOptionPane.showInputDialog( parentComponent: null,
81             message: "Nguyễn Thị Nhung 20215109 \nEquation: a11x1 + a12x2 = b1; a21x1 + a22x2 = b2" +
82             "\nPlease input the coefficient 'b1' for equation 1:",
83             title: "Nguyễn Thị Nhung 20215109 - Input the coefficient 'b1' ",
84             JOptionPane.INFORMATION_MESSAGE);
85         double b1 = Double.parseDouble(strNum3);
86         strNum4 = JOptionPane.showInputDialog( parentComponent: null,
87             message: "Nguyễn Thị Nhung 20215109 \nEquation: a11x1 + a12x2 = b1; a21x1 + a22x2 = b2" +
88             "\nPlease input the coefficient 'a21' for equation 2:",
89             title: "Nguyễn Thị Nhung 20215109 - Input the coefficient 'a21' ",
90             JOptionPane.INFORMATION_MESSAGE);
91         double a21 = Double.parseDouble(strNum4);
92         strNum5 = JOptionPane.showInputDialog( parentComponent: null,

```

```

92             message: "Nguyen Thi Nhung 20215109\nEquation: a11x1 + a12x2 = b1; a21x1 + a22x2 = b2" +
93                     "\nPlease input the coefficient 'a22' for equation 2:",
94                     title: "Nguyen Thi Nhung 20215109 - Input the coefficient 'a22' ",
95                     JOptionPane.INFORMATION_MESSAGE);
96             double a22 = Double.parseDouble(strNum5);
97             strNum6 = JOptionPane.showInputDialog( parentComponent: null,
98                     message: "Nguyen Thi Nhung 20215109\nEquation: a11x1 + a12x2 = b1; a21x1 + a22x2 = b2" +
99                     "\nPlease input the coefficient 'b2' for equation 2:",
100                    title: "Nguyen Thi Nhung 20215109 - Input the coefficient 'b2' ",
101                    JOptionPane.INFORMATION_MESSAGE);
102             double b2 = Double.parseDouble(strNum6);

103
104
105             double d = a11 * a22 - a21 * a12;
106             double d1 = b1 * a22 - b2 * a12;
107             double d2 = a11 * b2 - a21 * b1;

108
109             String strNotification = "Nguyen Thi Nhung 20215109 - Equation:\n" + a11 + " x1 + " + a12 + " x2 = " + b1 + ";\n"
110             if (d != 0) {
111                 double x1 = d1 / d;
112                 double x2 = d2 / d;
113                 strNotification += "\nSolution: x1 = " + x1 + ", x2 = " + x2;
114             } else {
115                 if (d1 == 0 && d2 == 0) {
116                     strNotification += "\nInfinite solutions";
117                 } else {
118                     strNotification += "\nNo solution";
119                 }
120             }
121             JOptionPane.showMessageDialog( parentComponent: null, strNotification,
122                     title: "Show Solution", JOptionPane.INFORMATION_MESSAGE);
123         }
124
125         1 usage ± nhungngn
126         public static void solveQuadraticEquation(Scanner scanner) {
127             String strNum1, strNum2, strNum3;
128             strNum1 = JOptionPane.showInputDialog( parentComponent: null,
129                     message: "Nguyen Thi Nhung 20215109 - Equation: ax^2 + bx + c = 0" +
130                     "\nPlease input the coefficient 'a' for the quadratic equation:",
131                     title: "Nguyen Thi Nhung 20215109 - Input the coefficient 'a' ",
132                     JOptionPane.INFORMATION_MESSAGE);
133             double a = Double.parseDouble(strNum1);
134             strNum2 = JOptionPane.showInputDialog( parentComponent: null,
135                     message: "Nguyen Thi Nhung 20215109 - Equation: ax^2 + bx + c = 0" +
136                     "\nPlease input the coefficient 'b' for the quadratic equation:",
137                     title: "Nguyen Thi Nhung 20215109 - Input the coefficient 'b' ",
138                     JOptionPane.INFORMATION_MESSAGE);
139             double b = Double.parseDouble(strNum2);

```

```

139     strNum3 = JOptionPane.showInputDialog( parentComponent: null,
140                                         message: "Nguyễn Thị Nhụng 20215109 - Equation: ax^2 + bx + c = 0" +
141                                         "\nPlease input the coefficient 'c' for the quadratic equation:",
142                                         title: "Nguyễn Thị Nhụng 20215109 - Input the coefficient 'c' ",
143                                         JOptionPane.INFORMATION_MESSAGE);
144     double c = Double.parseDouble(strNum3);
145
146     String strNotification = "Nguyễn Thị Nhụng 20215109 \nEquation: " + a + " x^2 + " + b + " x " + c + " = 0 ";
147
148     if (a == 0) {
149         strNotification += "\nNot a quadratic equation";
150     } else {
151         double discriminant = b * b - 4 * a * c;
152
153         if (discriminant > 0) {
154             double root1 = (-b + Math.sqrt(discriminant)) / (2 * a);
155             double root2 = (-b - Math.sqrt(discriminant)) / (2 * a);
156             strNotification += "\nRoots: x1 = " + root1 + ", x2 = " + root2;
157         } else if (discriminant == 0) {
158             double root = -b / (2 * a);
159             strNotification += "\nDouble root: x = " + root;
160         } else {
161             strNotification += "\nNo real roots";
162         }
163     }
164     JOptionPane.showMessageDialog( parentComponent: null, strNotification,
165                                 title: "Show Solution", JOptionPane.INFORMATION_MESSAGE);
166 }
167 }
```

Kết quả:

- First-degree equation (linear equation) with one variable:

```

1 package Lab_01;
2 import javax.swing.*;
3 import java.util.Scanner;
4
5 /**
6 * nhungnngn *
7 * public class EquationSolver {
8 *     /**
9 *      * nhungnngn *
10 *      * public static void main(String[] args) {
11 *          Scanner scanner = new Scanner(System.in);
12 *          String choice = JOptionPane.showInputDialog("Nguyen Thi Nhung 20215109 - Please select the type of equation", "1", "Nguyen Thi Nhung 20215109 - Select the type of equation", JOptionPane.INFORMATION_MESSAGE);
13 *          switch (choice) {
14 *              case "1":
15 *                  solveLinearEquation(scanner);
16 *                  break;
17 *              case "2":
18 *                  solveLinearSystem(scanner);
19 *                  break;
20 *          }
21 *      }
22 *      private void solveLinearEquation(Scanner scanner) {
23 *          String a = scanner.nextLine();
24 *          String b = scanner.nextLine();
25 *          String c = scanner.nextLine();
26 *          double d = Double.parseDouble(b) / Double.parseDouble(a);
27 *          System.out.println("The solution is: " + d);
28 *      }
29 *      private void solveLinearSystem(Scanner scanner) {
30 *          String a11 = scanner.nextLine();
31 *          String a12 = scanner.nextLine();
32 *          String a21 = scanner.nextLine();
33 *          String a22 = scanner.nextLine();
34 *          String b1 = scanner.nextLine();
35 *          String b2 = scanner.nextLine();
36 *          double x = ((Double.parseDouble(b1) - Double.parseDouble(b2)) * Double.parseDouble(a12) - Double.parseDouble(a21) * Double.parseDouble(b1)) / ((Double.parseDouble(a11) * Double.parseDouble(a22)) - (Double.parseDouble(a12) * Double.parseDouble(a21)));
37 *          double y = ((Double.parseDouble(b1) - Double.parseDouble(b2)) * Double.parseDouble(a11) - Double.parseDouble(a21) * Double.parseDouble(b1)) / ((Double.parseDouble(a11) * Double.parseDouble(a22)) - (Double.parseDouble(a12) * Double.parseDouble(a21)));
38 *          System.out.println("The solution is: " + x + ", " + y);
39 *      }
40 *  }
41 */

```

```

1 package Lab_01;
2 import javax.swing.*;
3 import java.util.Scanner;
4
5 /**
6 * nhungnghn *
7 * public class EquationSolver {
8 *     nhungnghn *
9 *     public static void main(String[] args) {
10 *         Scanner scanner = new Scanner(System.in);
11 *         String choice = JOptionPane.showInputDialog(null,
12 *             "Nguyen Thi Nhungh 20215109 - Please select the type of equation to solve:" +
13 *             "\n1. First-degree equation (linear equation) with one variable" +
14 *             "\n2. System of first-degree equations (linear system) with two variables" +
15 *             "\n3. Second-degree equation (quadratic equation) with one variable",
16 *             "Nguyen Thi Nhungh 20215109 - Select the type of equation",
17 *             JOptionPane.INFORMATION_MESSAGE);
18 *
19 *         switch (choice) {
20 *             case "1":
21 *                 solveLinearEquation(scanner);
22 *                 break;
23 *             case "2":
24 *                 solveLinearSystem(scanner);
25 *                 break;
26 *             case "3":
27 *                 solveQuadraticEquation(scanner);
28 *                 break;
29 *             default:
30 *                 System.out.println("Invalid choice");
31 *                 break;
32 *         }
33 *         System.exit(0);
34 *     }
35 * }

```

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

```

package Lab_01;
import javax.swing.*;
import java.util.Scanner;

public class EquationSolver {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);
        String choice = JOptionPane.showInputDialog("Nguyễn Thị Nhựng 20215109 - Please select the type of equation to solve:\n1. First-degree equation (linear equation) with one variable\n2. System of first-degree equations (linear system) with two variables\n3. Second-degree equation (quadratic equation) with one variable", "2", JOptionPane.INFORMATION_MESSAGE);
        switch (choice) {
            case "1":
                solveLinearEquation(scanner);
                break;
            case "2":
                solveLinearSystem(scanner);
                break;
        }
    }

    private static void solveLinearEquation(Scanner scanner) {
        double a11 = scanner.nextDouble();
        double b1 = scanner.nextDouble();
        double a21 = scanner.nextDouble();
        double b2 = scanner.nextDouble();
        double x = (b2 - b1) / (a21 - a11);
        System.out.println("The solution is: x = " + x);
    }

    private static void solveLinearSystem(Scanner scanner) {
        double a11 = scanner.nextDouble();
        double a12 = scanner.nextDouble();
        double a21 = scanner.nextDouble();
        double a22 = scanner.nextDouble();
        double b1 = scanner.nextDouble();
        double b2 = scanner.nextDouble();
        double x = (b2 - b1) / (a21 - a11);
        double y = (b1 - a11 * x) / a12;
        System.out.println("The solution is: x = " + x + ", y = " + y);
    }
}

```

The screenshot shows two instances of a Java IDE interface. Both instances have the same code editor window open, displaying a Java file named `EquationSolver.java`. The code implements a command-line application for solving linear equations. It uses `JOptionPane` to prompt the user for input. In the first instance, a dialog box is displayed, asking for the coefficient `a12`. The message in the dialog is: "Nguyen Thi Nhung 20215109 - Input the coefficient 'a12'" followed by the question "Please input the coefficient 'a12' for equation 1:". The user has entered the value `3` into the input field. In the second instance, another dialog box is displayed, asking for the coefficient `b1`. The message in the dialog is: "Nguyen Thi Nhung 20215109 - input the coefficient 'b1'" followed by the question "Please input the coefficient 'b1' for equation 1:". The user has entered the value `5` into the input field.

```

package Lab_01;
import javax.swing.*;
import java.util.Scanner;

public class EquationSolver {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);
        String choice = JOptionPane.showInputDialog("Nguyen Thi Nhung 20215109\nEquation: a11x1 + a12x2 = b1; a21x1 + a22x2 = b2\n1. First-degree\nequation\n2. System of\nequations\n3. Second-degree\nequation");
        int num = Integer.parseInt(choice);
        switch (num) {
            case 1:
                solveLinearEquation(scanner);
                break;
            case 2:
                solveLinearSystem(scanner);
                break;
        }
    }

    private static void solveLinearEquation(Scanner scanner) {
        double a11 = scanner.nextDouble();
        double a12 = scanner.nextDouble();
        double b1 = scanner.nextDouble();
        double x1 = (b1 - a11 * 1) / a12;
        JOptionPane.showMessageDialog(null, "The solution is x1 = " + x1);
    }

    private static void solveLinearSystem(Scanner scanner) {
        double a11 = scanner.nextDouble();
        double a12 = scanner.nextDouble();
        double a21 = scanner.nextDouble();
        double a22 = scanner.nextDouble();
        double b1 = scanner.nextDouble();
        double b2 = scanner.nextDouble();
        double x1 = (b1 * a22 - b2 * a12) / (a11 * a22 - a12 * a21);
        double x2 = (b1 - a11 * x1) / a12;
        JOptionPane.showMessageDialog(null, "The solution is x1 = " + x1 + ", x2 = " + x2);
    }
}

```

The screenshot shows a Java IDE interface with two identical dialog boxes overlaid on the code editor. Both dialogs are titled "Nguyen Thi Nhung 20215109" and have the message: "Equation: a11x1 + a12x2 = b1; a21x1 + a22x2 = b2". The first dialog asks for "Please input the coefficient 'a21' for equation 2:" and has the value "4" entered. The second dialog asks for "Please input the coefficient 'a22' for equation 2:" and has the value "1" entered. The code in the editor is for an EquationSolver class that handles linear equations.

```

package Lab_01;
import javax.swing.*;
import java.util.Scanner;

public class EquationSolver {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);
        String choice = JOptionPane.showInputDialog("Nguyen Thi Nhung 20215109 - Input the coefficient 'a21' \n\nEquation: a11x1 + a12x2 = b1; a21x1 + a22x2 = b2\nPlease input the coefficient 'a21' for equation 2:\n\n", "4", JOptionPane.INFORMATION_MESSAGE);

        switch (choice) {
            case "1":
                solveLinearEquation(scanner);
                break;
            case "2":
                solveLinearSystem(scanner);
                break;
        }
    }

    private void solveLinearEquation(Scanner scanner) {
        double x1 = scanner.nextDouble();
        double x2 = scanner.nextDouble();
        double b1 = scanner.nextDouble();
        double b2 = scanner.nextDouble();

        double a11 = 1.0;
        double a12 = 1.0;
        double a21 = 1.0;
        double a22 = 1.0;

        double d = a11 * a22 - a12 * a21;
        double x1_val = (a22 * b1 - a12 * b2) / d;
        double x2_val = (a11 * b2 - a21 * b1) / d;

        System.out.println("The solution is: x1 = " + x1_val + ", x2 = " + x2_val);
    }

    private void solveLinearSystem(Scanner scanner) {
        double x1 = scanner.nextDouble();
        double x2 = scanner.nextDouble();
        double b1 = scanner.nextDouble();
        double b2 = scanner.nextDouble();

        double a11 = 1.0;
        double a12 = 1.0;
        double a21 = 1.0;
        double a22 = 1.0;

        double d = a11 * a22 - a12 * a21;
        double x1_val = (a22 * b1 - a12 * b2) / d;
        double x2_val = (a11 * b2 - a21 * b1) / d;

        System.out.println("The solution is: x1 = " + x1_val + ", x2 = " + x2_val);
    }
}

```

The screenshot shows two instances of a Java IDE interface. Both instances have the same code editor window open, displaying a Java file named `EquationSolver.java`. The code implements a command-line application for solving linear equations. It uses `JOptionPane` to interact with the user via dialogs.

Top Dialog:

```

    package Lab_01;
    import javax.swing.*;
    import java.util.Scanner;

    public class EquationSolver {
        public static void main(String[] args) {
            Scanner scanner = new Scanner(System.in);
            String choice = JOptionPane.showInputDialog("Nguyen Thi Nhung 20215109 - Input the coefficient 'b2'" +
                "\n1. First-degree" +
                "\n2. System of linear equations" +
                "\n3. Second-degree", "3");
            int choiceInt = Integer.parseInt(choice);
            switch (choiceInt) {
                case 1:
                    solveLinearEquation(scanner);
                    break;
                case 2:
                    solveLinearSystem(scanner);
                    break;
            }
        }
    }
  
```

Bottom Dialog:

```

    package Lab_01;
    import javax.swing.*;
    import java.util.Scanner;

    public class EquationSolver {
        public static void main(String[] args) {
            Scanner scanner = new Scanner(System.in);
            String choice = JOptionPane.showInputDialog("Nguyen Thi Nhung 20215109 - Equation to solve:" +
                "\n1. First-degree" +
                "\n2. System of linear equations" +
                "\n3. Second-degree", "2");
            int choiceInt = Integer.parseInt(choice);
            switch (choiceInt) {
                case 1:
                    solveLinearEquation(scanner);
                    break;
                case 2:
                    solveLinearSystem(scanner);
                    break;
            }
        }
    }
  
```

- The second-degree equation with one variable:

```

package Lab_01;
import javax.swing.*;
import java.util.Scanner;

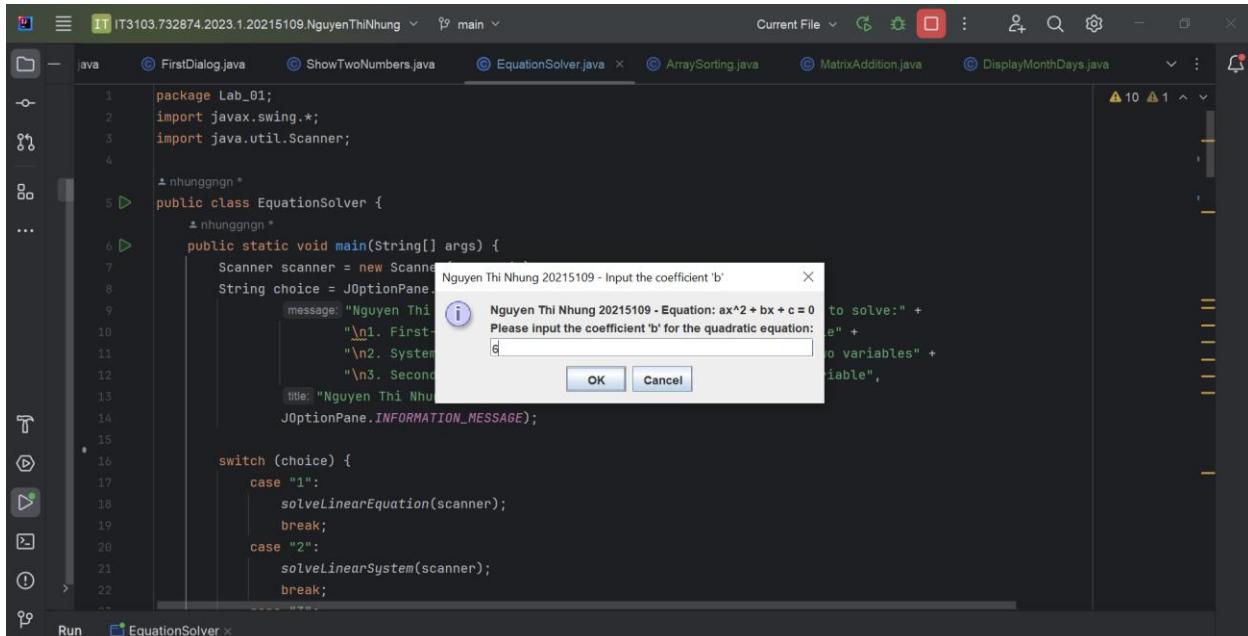
public class EquationSolver {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);
        String choice = JOptionPane.showInputDialog("Nguyen Thi Nhuring 20215109 - Please select the type of equation", "1. First-degree equation (linear equation) with one variable\n2. System of first-degree equations (linear system) with two variables\n3. Second-degree equation (quadratic equation) with one variable", "Nguyen Thi Nhuring 20215109", JOptionPane.INFORMATION_MESSAGE);
        switch (choice) {
            case "1":
                solveLinearEquation(scanner);
                break;
            case "2":
                solveLinearSystem(scanner);
                break;
            case "3":
                solveQuadraticEquation(scanner);
                break;
        }
    }

    private static void solveLinearEquation(Scanner scanner) {
        String a = JOptionPane.showInputDialog("Nguyen Thi Nhuring 20215109 - Input the coefficient 'a'", "Please input the coefficient 'a' for the linear equation", "Nguyen Thi Nhuring 20215109", JOptionPane.INFORMATION_MESSAGE);
        double coefficientA = Double.parseDouble(a);
        // Process the linear equation
    }

    private static void solveLinearSystem(Scanner scanner) {
        // Process the system of linear equations
    }

    private static void solveQuadraticEquation(Scanner scanner) {
        String a = JOptionPane.showInputDialog("Nguyen Thi Nhuring 20215109 - Equation: ax^2 + bx + c = 0", "Please input the coefficient 'a' for the quadratic equation", "Nguyen Thi Nhuring 20215109", JOptionPane.INFORMATION_MESSAGE);
        double coefficientA = Double.parseDouble(a);
        // Process the quadratic equation
    }
}

```



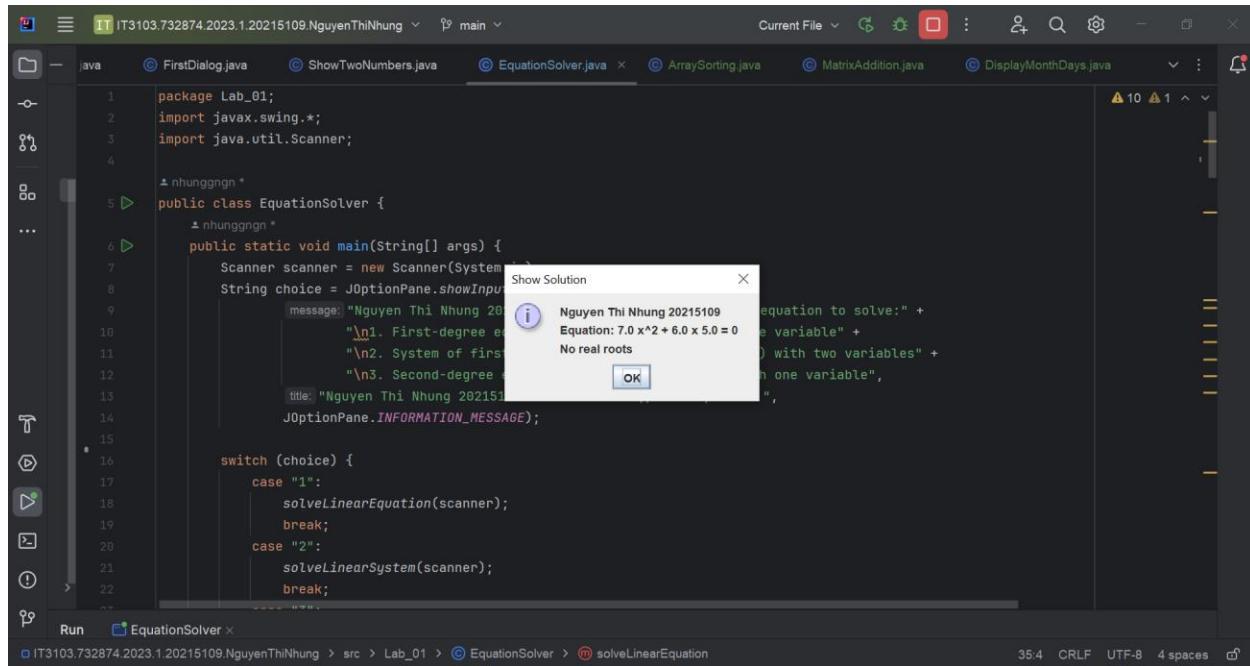
The screenshot shows a Java IDE interface with two windows. The top window displays a Java code file named EquationSolver.java. The code contains a main method that prompts the user to input the coefficient 'b' for a quadratic equation. A JOptionPane dialog box is overlaid on the code editor, asking for input. The dialog has the title "Nguyễn Thị Nhụng 20215109 - Input the coefficient 'b'", a message area with the text "Please input the coefficient 'b' for the quadratic equation:", and an input field containing the value "5". The bottom window shows the same code and dialog, indicating the application is running.

```

package Lab_01;
import javax.swing.*;
import java.util.Scanner;

public class EquationSolver {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);
        String choice = JOptionPane.showInputDialog("Nguyễn Thị Nhụng 20215109 - Equation: ax^2 + bx + c = 0\nPlease input the coefficient 'b' for the quadratic equation:");
        int b = Integer.parseInt(choice);
        // Process the input
    }
}

```



6 Excercises

6.1 Write, compile and run the ChoosingOption program:

Mã nguồn đề bài:

```

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 }
```

Figure 21. Choosing Option Application

Kết quả:

```

1 package Lab_01;
2
3 import javax.swing.JOptionPane;
4 new *
5 public class ChoosingOption {
6     new *
7     public static void main(String[] args) {
8         int option = JOptionPane.showConfirmDialog( parentComponent: null,
9             message: "Nguyen Thi Nhung 20215109 \nDo you want to change to the first class ticket?");
10        JOptionPane.showMessageDialog( parentComponent: null,
11            message: "Nguyen Thi Nhung 20215109 - You've chosen: " + option);
12        System.exit( status: 0);
13    }
14 }

```

The screenshot shows two instances of a Java application running in an IDE. The top instance displays a confirmation dialog box with the message: "Do you want to change to the first class ticket?". The bottom instance shows an information dialog box with the message: "NguyenThiNhung20215109-You've chosen: No". Both dialogs have standard buttons: Yes, No, Cancel (top) or OK (bottom).

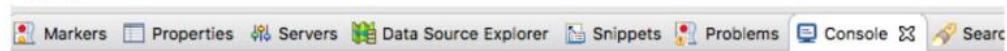
6.2 Write a program for input/output from keyboard

Mã nguồn đề bài:

```

1 import java.util.Scanner;
2 public class InputFromKeyboard{
3     public static void main(String args[]){
4         Scanner keyboard = new Scanner(System.in);
5
6         System.out.println("What's your name?");
7         String strName = keyboard.nextLine();
8         System.out.println("How old are you?");
9         int iAge = keyboard.nextInt();
10        System.out.println("How tall are you (m)?");
11        double dHeight = keyboard.nextDouble();
12
13        //similar to other data types
14        //nextByte(), nextShort(), nextLong()
15        //nextFloat(), nextBoolean()
16
17        System.out.println("Mrs/Ms. " + strName + ", " + iAge + " years old. "
18                            + "Your height is " + dHeight + ".");
19
20    }
21 }

```



```

<terminated> InputFromKeyboard [Java Application] /Library/Java/JavaVirtualMachines/jdk1.8.0_171.jdk/Contents/Home/bin/
What's your name?
Trang
How old are you?
35
How tall are you (m)?
1.65
Mrs/Ms. Trang, 35 years old. Your height is 1.65.

```

Figure 25. InputFromKeyboard Application

Kết quả:

The screenshot shows the IntelliJ IDEA interface with the code editor displaying the `InputFromKeyboard.java` file. The run output window below shows the program's execution and the user's input.

```

5 Scanner keyboard = new Scanner(System.in);
6 System.out.println("Nguyễn Thị Nhựng 20215109 - What's your name?");
7 String strName = keyboard.nextLine();
8 System.out.println("Nguyễn Thị Nhựng 20215109 - How old are you?");
9 int iAge = keyboard.nextInt();
10 System.out.println("Nguyễn Thị Nhựng 20215109 - How tall are you (m)?");
11 double dHeight = Keyboard.nextDouble();
12 //similar to other data types
13 //nextByte(),nextShort(),nextLong()
14 //nextFloat(),nextBoolean()

Run InputFromKeyboard x

↑ "C:\Program Files\Java\jdk-21\bin\java.exe" "-javaagent:C:\Program Files\JetBrains\IntelliJ IDEA Community Edition 2023.2.3\lib\idea_rt.jar=5172:
↓ Nguyễn Thị Nhựng 20215109 - What's your name?
Nhunggngn
↓ Nguyễn Thị Nhựng 20215109 - How old are you?
20
↓ Nguyễn Thị Nhựng 20215109 - How tall are you (m)?
1.9
↓ Mrs/Ms. Nhunggngn, 20 years old. Your height is 1.9.

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.

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

- Project:** IT3103.732874.2023.1.20215109.NguyenThiNhung
- Current File:** main
- Code Editor:** The file TriangleDisplay.java is open, displaying the following Java code:

```
package Lab_01;
import java.util.Scanner;

new *
public class TriangleDisplay {
    new *
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);
        System.out.print("Please 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 j = 1; j < 2 * i; j++){
                System.out.print("*");
            }
            System.out.println();
        }
    }
}
```
- Toolbars and Buttons:** Standard IntelliJ IDEA toolbars and buttons for Run, Stop, Refresh, and Help.
- Status Bar:** Shows the file path: IT3103.732874.2023.1.20215109.NguyenThiNhung > src > Lab_01 > TriangleDisplay > main, and system information: 16.32 CRLF UTF-8 4 spaces.

Kết quả:

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.

```

1 package Lab_01;
2
3 import java.util.Scanner;
4
5 new *
6 public class DisplayMonthDays {
7     new *
8         public static void main(String[] args) {
9             Scanner scanner = new Scanner(System.in);
10
11             int year = getValidYear(scanner);
12             int month = getValidMonth(scanner);
13
14             int days = getNumberOfDays(month, year);
15             System.out.println("Number of days: " + days);
16         }
17
18     @
19     private static int getValidYear(Scanner scanner) {
20         int year;
21         do {
22             System.out.print("Please enter the year: ");
23             while (!scanner.hasNextInt()) {
24                 System.out.println("Invalid input. Please enter a valid year.");
25                 scanner.next();
26             }
27             year = scanner.nextInt();
28             if (year < 0) {
29                 System.out.println("Invalid input. Please enter a non-negative year.");
30             }
31         } while (year < 0);
32         return year;
33     }
34
35     @
36     private static int getValidMonth(Scanner scanner) {
37         int month;
38         do {
39             System.out.print("Please enter the month: ");
40             String input = scanner.next();
41             switch (input.toLowerCase()) {
42                 case "january":
43                 case "jan.":
44                 case "jan":
45                 case "1":
46                     month = 1;
47                     break;
48                 case "february":
49                 case "feb.":
50                 case "feb":
51                 case "2":
52                     month = 2;
53                     break;
54                 case "march":
55                 case "mar.":
56                 case "mar":
57                 case "3":
58                     month = 3;
59                     break;
60                 case "april":
61                 case "apr.":
62                 case "apr":
63                 case "4":
64                     month = 4;
65                     break;
66                 case "may":
67                 case "5":
68                     month = 5;
69                     break;
70                 case "june":
71                 case "jun.":
72                 case "jun":
73                 case "6":
74                     month = 6;
75                     break;
76                 case "july":
77                 case "jul.":
78                 case "jul":
79                 case "7":
80                     month = 7;
81                     break;
82                 case "august":
83                 case "aug.":
84                 case "aug":
85                 case "8":
86                     month = 8;
87                     break;
88                 case "september":
89                 case "sep.":
90                 case "sep":
91                 case "9":
92                     month = 9;
93                     break;
94                 case "october":
95                 case "oct.":
96                 case "oct":
97                 case "10":
98                     month = 10;
99                     break;
100                case "november":
101                case "nov.":
102                case "nov":
103                    month = 11;
104                    break;
105                case "december":
106                case "dec.":
107                case "dec":
108                case "12":
109                    month = 12;
110                    break;
111            }
112        }
113    }
114
115    usage new *
116
117    private static int getNumberOfDays(int month, int year) {
118        int days;
119        switch (month) {
120            case 1:
121            case 3:
122            case 5:
123            case 7:
124            case 8:
125            case 10:
126            case 12:
127                days = 31;
128                break;
129            case 4:
130            case 6:
131            case 9:
132            case 11:
133                days = 30;
134                break;
135            case 2:
136                days = 28;
137                break;
138            case 0:
139                days = 0;
140                break;
141        }
142        return days;
143    }
144
145    usage new *
146
147    private static int getValidYear(Scanner scanner) {
148        int year;
149        do {
150            System.out.print("Please enter the year: ");
151            while (!scanner.hasNextInt()) {
152                System.out.println("Invalid input. Please enter a valid year.");
153                scanner.next();
154            }
155            year = scanner.nextInt();
156            if (year < 0) {
157                System.out.println("Invalid input. Please enter a non-negative year.");
158            }
159        } while (year < 0);
160        return year;
161    }
162
163    usage new *
164
165    private static int getValidMonth(Scanner scanner) {
166        int month;
167        do {
168            System.out.print("Please enter the month: ");
169            String input = scanner.next();
170            switch (input.toLowerCase()) {
171                case "january":
172                case "jan.":
173                case "jan":
174                case "1":
175                    month = 1;
176                    break;
177                case "february":
178                case "feb.":
179                case "feb":
180                case "2":
181                    month = 2;
182                    break;
183                case "march":
184                case "mar.":
185                case "mar":
186                case "3":
187                    month = 3;
188                    break;
189                case "april":
190                case "apr.":
191                case "apr":
192                case "4":
193                    month = 4;
194                    break;
195                case "may":
196                case "5":
197                    month = 5;
198                    break;
199                case "june":
200                case "jun.":
201                case "jun":
202                case "6":
203                    month = 6;
204                    break;
205                case "july":
206                case "jul.":
207                case "jul":
208                case "7":
209                    month = 7;
210                    break;
211                case "august":
212                case "aug.":
213                case "aug":
214                case "8":
215                    month = 8;
216                    break;
217                case "september":
218                case "sep.":
219                case "sep":
220                case "9":
221                    month = 9;
222                    break;
223                case "october":
224                case "oct.":
225                case "oct":
226                case "10":
227                    month = 10;
228                    break;
229                case "november":
230                case "nov.":
231                case "nov":
232                case "11":
233                    month = 11;
234                    break;
235                case "december":
236                case "dec.":
237                case "dec":
238                case "12":
239                    month = 12;
240                    break;
241            }
242        }
243    }
244
245    usage new *
246
247    private static int getValidMonth(Scanner scanner) {
248        int month;
249        do {
250            System.out.print("Please enter the month: ");
251            String input = scanner.next();
252            switch (input.toLowerCase()) {
253                case "january":
254                case "jan.":
255                case "jan":
256                case "1":
257                    month = 1;
258                    break;
259                case "february":
260                case "feb.":
261                case "feb":
262                case "2":
263                    month = 2;
264                    break;
265                case "march":
266                case "mar.":
267                case "mar":
268                case "3":
269                    month = 3;
270                    break;
271                case "april":
272                case "apr.":
273                case "apr":
274                case "4":
275                    month = 4;
276                    break;
277                case "may":
278                case "5":
279                    month = 5;
280                    break;
281                case "june":
282                case "jun.":
283                case "jun":
284                case "6":
285                    month = 6;
286                    break;
287                case "july":
288                case "jul.":
289                case "jul":
290                case "7":
291                    month = 7;
292                    break;
293                case "august":
294                case "aug.":
295                case "aug":
296                case "8":
297                    month = 8;
298                    break;
299                case "september":
300                case "sep.":
301                case "sep":
302                case "9":
303                    month = 9;
304                    break;
305                case "october":
306                case "oct.":
307                case "oct":
308                case "10":
309                    month = 10;
310                    break;
311                case "november":
312                case "nov.":
313                case "nov":
314                case "11":
315                    month = 11;
316                    break;
317                case "december":
318                case "dec.":
319                case "dec":
320                case "12":
321                    month = 12;
322                    break;
323            }
324        }
325    }
326
327    usage new *
328
329    private static int getValidYear(Scanner scanner) {
330        int year;
331        do {
332            System.out.print("Please enter the year: ");
333            while (!scanner.hasNextInt()) {
334                System.out.println("Invalid input. Please enter a valid year.");
335                scanner.next();
336            }
337            year = scanner.nextInt();
338            if (year < 0) {
339                System.out.println("Invalid input. Please enter a non-negative year.");
340            }
341        } while (year < 0);
342        return year;
343    }
344
345    usage new *
346
347    private static int getValidMonth(Scanner scanner) {
348        int month;
349        do {
350            System.out.print("Please enter the month: ");
351            String input = scanner.next();
352            switch (input.toLowerCase()) {
353                case "january":
354                case "jan.":
355                case "jan":
356                case "1":
357                    month = 1;
358                    break;
359                case "february":
360                case "feb.":
361                case "feb":
362                case "2":
363                    month = 2;
364                    break;
365                case "march":
366                case "mar.":
367                case "mar":
368                case "3":
369                    month = 3;
370                    break;
371                case "april":
372                case "apr.":
373                case "apr":
374                case "4":
375                    month = 4;
376                    break;
377                case "may":
378                case "5":
379                    month = 5;
380                    break;
381                case "june":
382                case "jun.":
383                case "jun":
384                case "6":
385                    month = 6;
386                    break;
387                case "july":
388                case "jul.":
389                case "jul":
390                case "7":
391                    month = 7;
392                    break;
393                case "august":
394                case "aug.":
395                case "aug":
396                case "8":
397                    month = 8;
398                    break;
399                case "september":
400                case "sep.":
401                case "sep":
402                case "9":
403                    month = 9;
404                    break;
405                case "october":
406                case "oct.":
407                case "oct":
408                case "10":
409                    month = 10;
410                    break;
411                case "november":
412                case "nov.":
413                case "nov":
414                case "11":
415                    month = 11;
416                    break;
417                case "december":
418                case "dec.":
419                case "dec":
420                case "12":
421                    month = 12;
422                    break;
423            }
424        }
425    }
426
427    usage new *
428
429    private static int getValidYear(Scanner scanner) {
430        int year;
431        do {
432            System.out.print("Please enter the year: ");
433            while (!scanner.hasNextInt()) {
434                System.out.println("Invalid input. Please enter a valid year.");
435                scanner.next();
436            }
437            year = scanner.nextInt();
438            if (year < 0) {
439                System.out.println("Invalid input. Please enter a non-negative year.");
440            }
441        } while (year < 0);
442        return year;
443    }
444
445    usage new *
446
447    private static int getValidMonth(Scanner scanner) {
448        int month;
449        do {
450            System.out.print("Please enter the month: ");
451            String input = scanner.next();
452            switch (input.toLowerCase()) {
453                case "january":
454                case "jan.":
455                case "jan":
456                case "1":
457                    month = 1;
458                    break;
459                case "february":
460                case "feb.":
461                case "feb":
462                case "2":
463                    month = 2;
464                    break;
465                case "march":
466                case "mar.":
467                case "mar":
468                case "3":
469                    month = 3;
470                    break;
471                case "april":
472                case "apr.":
473                case "apr":
474                case "4":
475                    month = 4;
476                    break;
477                case "may":
478                case "5":
479                    month = 5;
480                    break;
481                case "june":
482                case "jun.":
483                case "jun":
484                case "6":
485                    month = 6;
486                    break;
487                case "july":
488                case "jul.":
489                case "jul":
490                case "7":
491                    month = 7;
492                    break;
493                case "august":
494                case "aug.":
495                case "aug":
496                case "8":
497                    month = 8;
498                    break;
499                case "september":
500                case "sep.":
501                case "sep":
502                case "9":
503                    month = 9;
504                    break;
505                case "october":
506                case "oct.":
507                case "oct":
508                case "10":
509                    month = 10;
510                    break;
511                case "november":
512                case "nov.":
513                case "nov":
514                case "11":
515                    month = 11;
516                    break;
517                case "december":
518                case "dec.":
519                case "dec":
520                case "12":
521                    month = 12;
522                    break;
523            }
524        }
525    }
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527    usage new *
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533            while (!scanner.hasNextInt()) {
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536            }
537            year = scanner.nextInt();
538            if (year < 0) {
539                System.out.println("Invalid input. Please enter a non-negative year.");
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541        } while (year < 0);
542        return year;
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545    usage new *
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550            System.out.print("Please enter the month: ");
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555                case "jan":
556                case "1":
557                    month = 1;
558                    break;
559                case "february":
560                case "feb.":
561                case "feb":
562                case "2":
563                    month = 2;
564                    break;
565                case "march":
566                case "mar.":
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568                case "3":
569                    month = 3;
570                    break;
571                case "april":
572                case "apr.":
573                case "apr":
574                case "4":
575                    month = 4;
576                    break;
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578                case "5":
579                    month = 5;
580                    break;
581                case "june":
582                case "jun.":
583                case "jun":
584                case "6":
585                    month = 6;
586                    break;
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588                case "jul.":
589                case "jul":
590                case "7":
591                    month = 7;
592                    break;
593                case "august":
594                case "aug.":
595                case "aug":
596                case "8":
597                    month = 8;
598                    break;
599                case "september":
600                case "sep.":
601                case "sep":
602                case "9":
603                    month = 9;
604                    break;
605                case "october":
606                case "oct.":
607                case "oct":
608                case "10":
609                    month = 10;
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611                case "november":
612                case "nov.":
613                case "nov":
614                case "11":
615                    month = 11;
616                    break;
617                case "december":
618                case "dec.":
619                case "dec":
620                case "12":
621                    month = 12;
622                    break;
623            }
624        }
625    }
626
627    usage new *
628
629    private static int getValidYear(Scanner scanner) {
630        int year;
631        do {
632            System.out.print("Please enter the year: ");
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634                System.out.println("Invalid input. Please enter a valid year.");
635                scanner.next();
636            }
637            year = scanner.nextInt();
638            if (year < 0) {
639                System.out.println("Invalid input. Please enter a non-negative year.");
640            }
641        } while (year < 0);
642        return year;
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652            switch (input.toLowerCase()) {
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654                case "jan.":
655                case "jan":
656                case "1":
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658                    break;
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660                case "feb.":
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662                case "2":
663                    month = 2;
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666                case "mar.":
667                case "mar":
668                case "3":
669                    month = 3;
670                    break;
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672                case "apr.":
673                case "apr":
674                case "4":
675                    month = 4;
676                    break;
677                case "may":
678                case "5":
679                    month = 5;
680                    break;
681                case "june":
682                case "jun.":
683                case "jun":
684                case "6":
685                    month = 6;
686                    break;
687                case "july":
688                case "jul.":
689                case "jul":
690                case "7":
691                    month = 7;
692                    break;
693                case "august":
694                case "aug.":
695                case "aug":
696                case "8":
697                    month = 8;
698                    break;
699                case "september":
700                case "sep.":
701                case "sep":
702                case "9":
703                    month = 9;
704                    break;
705                case "october":
706                case "oct.":
707                case "oct":
708                case "10":
709                    month = 10;
710                    break;
711                case "november":
712                case "nov.":
713                case "nov":
714                case "11":
715                    month = 11;
716                    break;
717                case "december":
718                case "dec.":
719                case "dec":
720                case "12":
721                    month = 12;
722                    break;
723            }
724        }
725    }
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735                scanner.next();
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737            year = scanner.nextInt();
738            if (year < 0) {
739                System.out.println("Invalid input. Please enter a non-negative year.");
740            }
741        } while (year < 0);
742        return year;
743    }
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746
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751            String input = scanner.next();
752            switch (input.toLowerCase()) {
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755                case "jan":
756                case "1":
757                    month = 1;
758                    break;
759                case "february":
760                case "feb.":
761                case "feb":
762                case "2":
763                    month = 2;
764                    break;
765                case "march":
766                case "mar.":
767                case "mar":
768                case "3":
769                    month = 3;
770                    break;
771                case "april":
772                case "apr.":
773                case "apr":
774                case "4":
775                    month = 4;
776                    break;
777                case "may":
778                case "5":
779                    month = 5;
780                    break;
781                case "june":
782                case "jun.":
783                case "jun":
784                case "6":
785                    month = 6;
786                    break;
787                case "july":
788                case "jul.":
789                case "jul":
790                case "7":
791                    month = 7;
792                    break;
793                case "august":
794                case "aug.":
795                case "aug":
796                case "8":
797                    month = 8;
798                    break;
799                case "september":
800                case "sep.":
801                case "sep":
802                case "9":
803                    month = 9;
804                    break;
805                case "october":
806                case "oct.":
807                case "oct":
808                case "10":
809                    month = 10;
810                    break;
811                case "november":
812                case "nov.":
813                case "nov":
814                case "11":
815                    month = 11;
816                    break;
817                case "december":
818                case "dec.":
819                case "dec":
820                case "12":
821                    month = 12;
822                    break;
823            }
824        }
825    }
826
827    usage new *
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836            }
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839                System.out.println("Invalid input. Please enter a non-negative year.");
840            }
841        } while (year < 0);
842        return year;
843    }
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845    usage new *
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852            switch (input.toLowerCase()) {
853                case "january":
854                case "jan.":
855                case "jan":
856                case "1":
857                    month = 1;
858                    break;
859                case "february":
860                case "feb.":
861                case "feb":
862                case "2":
863                    month = 2;
864                    break;
865                case "march":
866                case "mar.":
867                case "mar":
868                case "3":
869                    month = 3;
870                    break;
871                case "april":
872                case "apr.":
873                case "apr":
874                case "4":
875                    month = 4;
876                    break;
877                case "may":
878                case "5":
879                    month = 5;
880                    break;
881                case "june":
882                case "jun.":
883                case "jun":
884                case "6":
885                    month = 6;
886                    break;
887                case "july":
888                case "jul.":
889                case "jul":
890                case "7":
891                    month = 7;
892                    break;
893                case "august":
894                case "aug.":
895                case "aug":
896                case "8":
897                    month = 8;
898                    break;
899                case "september":
900                case "sep.":
901                case "sep":
902                case "9":
903                    month = 9;
904                    break;
905                case "october":
906                case "oct.":
907                case "oct":
908                case "10":
909                    month = 10;
910                    break;
911                case "november":
912                case "nov.":
913                case "nov":
914                case "11":
915                    month = 11;
916                    break;
917                case "december":
918                case "dec.":
919                case "dec":
920                case "12":
921                    month = 12;
922                    break;
923            }
924        }
925    }
926
927    usage new *
928
929    private static int getValidYear(Scanner scanner) {
930        int year;
931        do {
932            System.out.print("Please enter the year: ");
933            while (!scanner.hasNextInt()) {
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935                scanner.next();
936            }
937            year = scanner.nextInt();
938            if (year < 0) {
939                System.out.println("Invalid input. Please enter a non-negative year.");
940            }
941        } while (year < 0);
942        return year;
943    }
944
945    usage new *
946
947    private static int getValidMonth(Scanner scanner) {
948        int month;
949        do {
950            System.out.print("Please enter the month: ");
951            String input = scanner.next();
952            switch (input.toLowerCase()) {
953                case "january":
954                case "jan.":
955                case "jan":
956                case "1":
957                    month = 1;
958                    break;
959                case "february":
960                case "feb.":
961                case "feb":
962                case "2":
963                    month = 2;
964                    break;
965                case "march":
966                case "mar.":
967                case "mar":
968                case "3":
969                    month = 3;
970                    break;
971                case "april":
972                case "apr.":
973                case "apr":
974                case "4":
975                    month = 4;
976                    break;
977                case "may":
978                case "5":
979                    month = 5;
980                    break;
981                case "june":
982                case "jun.":
983                case "jun":
984                case "6":
985                    month = 6;
986                    break;
987                case "july":
988                case "jul.":
989                case "jul":
990                case "7":
991                    month = 7;
992                    break;
993                case "august":
994                case "aug.":
995                case "aug":
996                case "8":
997                    month = 8;
998                    break;
999                case "september":
1000                case "sep.":
1001                case "sep":
1002                case "9":
1003                    month = 9;
1004                    break;
1005                case "october":
1006                case "oct.":
1007                case "oct":
1008                case "10":
1009                    month = 10;
1010                    break;
1011                case "november":
1012                case "nov.":
1013                case "nov":
1014                case "11":
1015                    month = 11;
1016                    break;
1017                case "december":
1018                case "dec.":
1019                case "dec":
1020                case "12":
1021                    month = 12;
1022                    break;
1023            }
1024        }
1025    }
1026
1027    usage new *
1028
1029    private static int getValidYear(Scanner scanner) {
1030        int year;
1031        do {
1032            System.out.print("Please enter the year: ");
1033            while (!scanner.hasNextInt()) {
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1035                scanner.next();
1036            }
1037            year = scanner.nextInt();
1038            if (year < 0) {
1039                System.out.println("Invalid input. Please enter a non-negative year.");
1040            }
1041        } while (year < 0);
1042        return year;
1043    }
1044
1045    usage new *
1046
1047    private static int getValidMonth(Scanner scanner) {
1048        int month;
1049        do {
1050            System.out.print("Please enter the month: ");
1051            String input = scanner.next();
1052            switch (input.toLowerCase()) {
1053                case "january":
1054                case "jan.":
1055                case "jan":
1056                case "1":
1057                    month = 1;
1058                    break;
1059                case "february":
1060                case "feb.":
1061                case "feb":
1062                case "2":
1063                    month = 2;
1064                    break;
1065                case "march":
1066                case "mar.":
1067                case "mar":
1068                case "3":
1069                    month = 3;
1070                    break;
1071                case "april":
1072                case "apr.":
1073                case "apr":
1074                case "4":
1075                    month = 4;
1076                    break;
1077                case "may":
1078                case "5":
1079                    month = 5;
1080                    break;
1081                case "june":
1082                case "jun.":
1083                case "jun":
1084                case "6":
1085                    month = 6;
1086                    break;
1087                case "july":
1088                case "jul.":
1089                case "jul":
1090                case "7":
1091                    month = 7;
1092                    break;
1093                case "august":
1094                case "aug.":
1095                case "aug":
1096                case "8":
1097                    month = 8;
1098                    break;
1099                case "september":
1100                case "sep.":
1101                case "sep":
1102                case "9":
1103                    month = 9;
1104                    break;
1105                case "october":
1106                case "oct.":
1107                case "oct":
1108                case "10":
1109                    month = 10;
1110                    break;
1111                case "november":
1112                case "nov.":
1113                case "nov":
1114                case "11":
1115                    month = 11;
1116                    break;
1117                case "december":
1118                case "dec.":
1119                case "dec":
1120                case "12":
1121                    month = 12;
1122                    break;
1123            }
1124        }
1125    }
1126
1127    usage new *
1128
1129    private static int getValidYear(Scanner scanner) {
1130        int year;
1131        do {
1132            System.out.print("Please enter the year: ");
1133            while (!scanner.hasNextInt()) {
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1136            }
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1138            if (year < 0) {
1139                System.out.println("Invalid input. Please enter a non-negative year.");
1140            }
1141        } while (year < 0);
1142        return year;
1143    }
1144
1145    usage new *
1146
1147    private static int getValidMonth(Scanner scanner) {
1148        int month;
1149        do {
1150            System.out.print("Please enter the month: ");
1151            String input = scanner.next();
1152            switch (input.toLowerCase()) {
1153                case "january":
1154                case "jan.":
1155                case "jan":
1156                case "1":
1157                    month = 1;
1158                    break;
1159                case "february":
1160                case "feb.":
1161                case "feb":
1162                case "2":
1163                    month = 2;
1164                    break;
1165                case "march":
1166                case "mar.":
1167                case "mar":
1168                case "3":
1169                    month = 3;
1170                    break;
1171                case "april":
1172                case "apr.":
1173                case "apr":
1174                case "4":
1175                    month = 4;
1176                    break;
1177                case "may":
1178                case "5":
1179                    month = 5;
1180                    break;
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1182                case "jun.":
1183                case "jun":
1184                case "6":
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1187                case "july":
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1189                case "jul":
1190                case "7":
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1193                case "august":
1194                case "aug.":
1195                case "aug":
1196                case "8":
1197                    month = 8;
1198                    break;
1199                case "september":
1200                case "sep.":
1201                case "sep":
1202                case "9":
1203                    month = 9;
1204                    break;
1205                case "october":
1206                case "oct.":
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1217                case "december":
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1219                case "dec":
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1241        } while (year < 0);
1242        return year;
1243    }
1244
1245    usage new *
1246
1247    private static int getValidMonth(Scanner scanner) {
1248        int month;
1249        do {
1250            System.out.print("Please enter the month: ");
1251            String input = scanner.next();
1252            switch (input.toLowerCase()) {
1253                case "january":
1254                case "jan.":
1255                case "jan":
1256                case "1":
1257                    month = 1;
1258                    break;
1259                case "february":
1260                case "feb.":
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1295                case "aug":
1296                case "8":
1297                    month = 8;
1298                    break;
1299                case "september":
1300                case "sep.":
1301                case "sep":
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1311                case "november":
1312                case "nov.":
1313                case "nov":
1314                case "11":
1315                    month = 11;
1316                    break;
1317                case "december":
1318                case "dec.":
1319                case "dec":
1320                case "12":
1321                    month =
```

```
97     case "nov":
98     case "nov":
99     case "11":
100         month = 11;
101         break;
102     case "december":
103     case "dec__":
104     case "dec":
105     case "12":
106         month = 12;
107         break;
108     default:
109         month = 0;
110         System.out.println("Invalid input. Please enter a valid month.");
111     }
112 } while (month == 0);
113 return month;
114 }
115
116 /**
117  * @usage new *
118  * @private static int getNumberOfDays(int month, int year) {
119  *     int days;
120  *     switch (month) {
121  *         case 1:
122  *         case 3:
123  *         case 5:
124  *         case 7:
125  *         case 8:
126  *         case 10:
127  *         case 12:
128  *             days = 31;
129  *             break;
130  *         case 4:
131  *         case 6:
132  *         case 9:
133  *         case 11:
134  *             days = 30;
135  *             break;
136  *         case 2:
137  *             days = isLeapYear(year) ? 29 : 28;
138  *             break;
139  *         default:
140  *             days = 0;
141  *     }
142  *     return days;
143  * }
144  */
145
146 }
```

The screenshot shows the IntelliJ IDEA interface. The top navigation bar displays the project name "IT3103.732874.2023.1.20215109.NguyenThiNhung". The main editor window contains several Java files: ChoosingOption.java, InputFromKeyboard.java, TriangleDisplay.java, ArraySorting.java, MatrixAddition.java, and DisplayMonthDays.java. The "DisplayMonthDays.java" file is open, showing the following code:

```
package Lab_01;
import java.util.Scanner;
new *

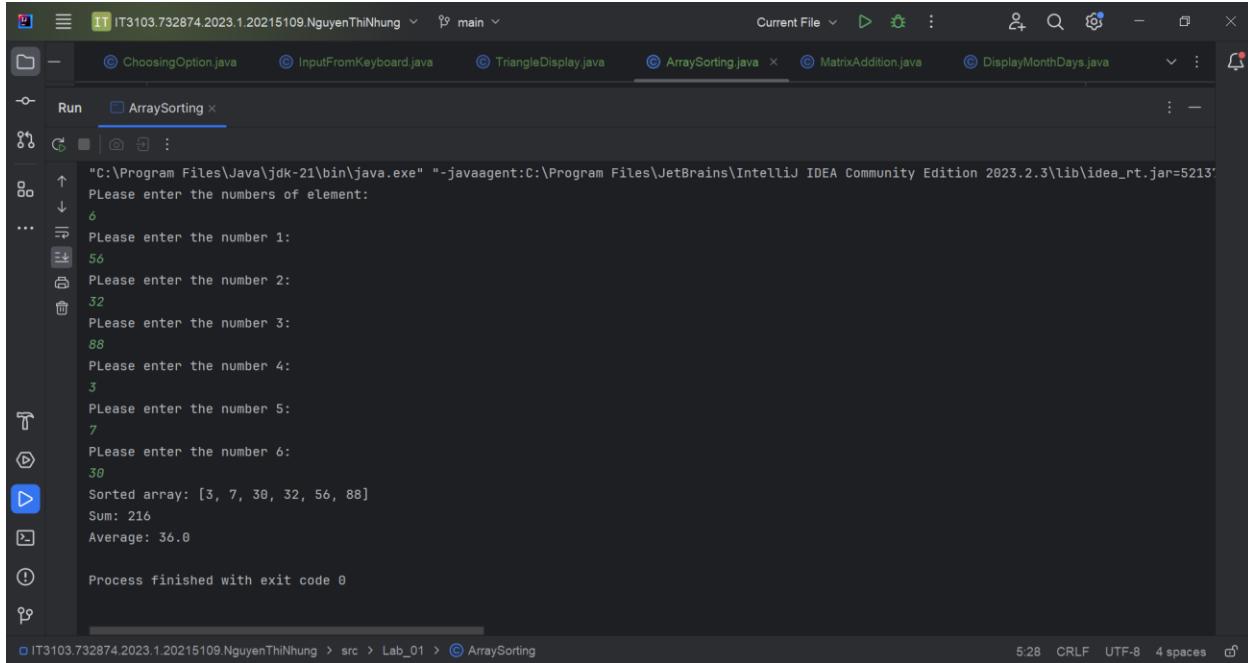
Run DisplayMonthDays<x>

C:\Program Files\Java\jdk-21\bin\java.exe" "-javaagent:C:\Program Files\JetBrains\IntelliJ IDEA Community Edition 2023.2.3\lib\idea_rt.jar=5202:
Please enter the year: 2008
Please enter the month: 2
Number of days: 29
Process finished with exit code 0
```

The bottom status bar indicates the path "IT3103.732874.2023.1.20215109.NguyenThiNhung > src > Lab_01 > DisplayMonthDays > getValidMonth" and the file statistics "46:28 CRLF UTF-8 4 spaces".

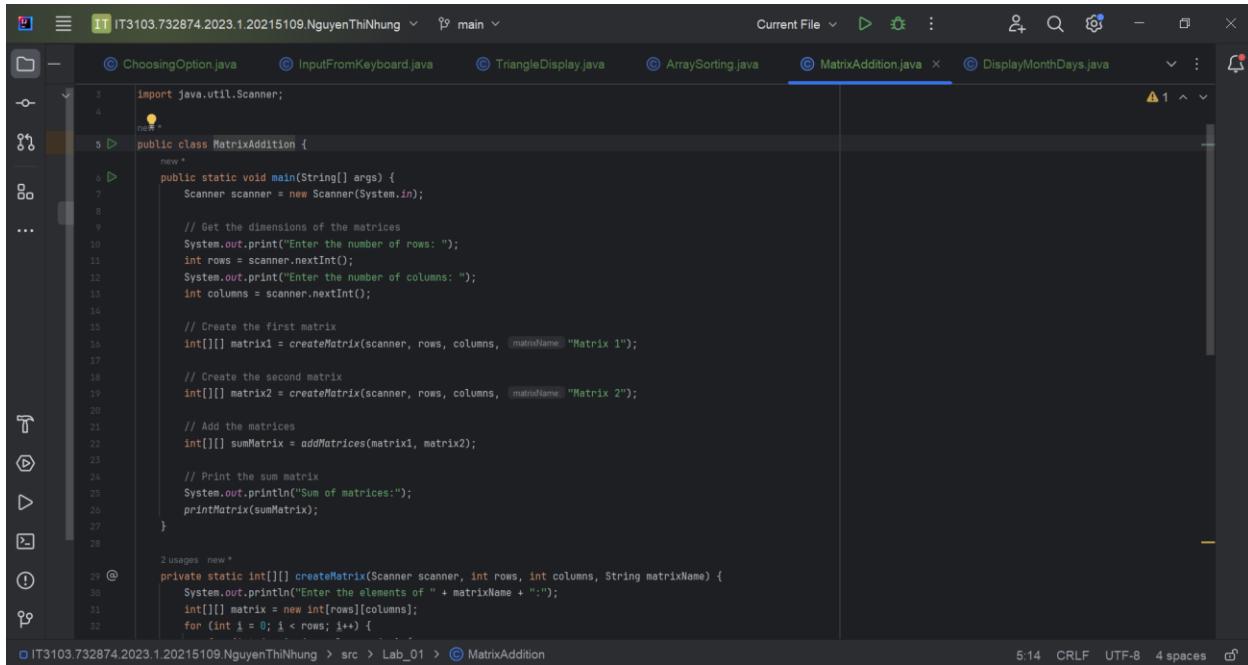
6.5 Write a Java program to sort a numeric array, and calculate the sum and average value of array elements.

```
1 package Lab_01;
2 import java.util.Scanner;
3 import java.util.Arrays;
4
5 new *
6 D public class ArraySorting {
7     new *
8     public static void main(String[] args) {
9         Scanner keyboard = new Scanner(System.in);
10        System.out.println("Please enter the numbers of element:");
11        int n = keyboard.nextInt();
12        int iSum = 0;
13        int[] array = new int[n];
14        for (int i = 0; i < n; i++) {
15            int b = i + 1;
16            System.out.println("Please enter the number " + b + ": ");
17            array[i] = keyboard.nextInt();
18        }
19        // Sort the array in ascending order
20        Arrays.sort(array);
21
22        // Print the sorted array
23        System.out.println("Sorted array: " + Arrays.toString(array));
24
25        // Calculate the sum of array elements
26        int sum = 0;
27        for (int num : array) {
28            sum += num;
29        }
30        System.out.println("Sum: " + sum);
31
32        // Calculate the average value of array elements
33        double average = (double) sum / array.length;
34        System.out.println("Average: " + average);
35    }
36
```



```
"C:\Program Files\Java\jdk-21\bin\java.exe" "-javaagent:C:\Program Files\JetBrains\IntelliJ IDEA Community Edition 2023.2.3\lib\idea_rt.jar=5213"
Please enter the numbers of element:
6
Please enter the number 1:
56
Please enter the number 2:
32
Please enter the number 3:
88
Please enter the number 4:
3
Please enter the number 5:
7
Please enter the number 6:
30
Sorted array: [3, 7, 30, 32, 56, 88]
Sum: 216
Average: 36.0
Process finished with exit code 0
```

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



```
import java.util.Scanner;

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

        // Get the dimensions of the matrices
        System.out.print("Enter the number of rows: ");
        int rows = scanner.nextInt();
        System.out.print("Enter the number of columns: ");
        int columns = scanner.nextInt();

        // Create the first matrix
        int[][] matrix1 = createMatrix(scanner, rows, columns, "Matrix 1");

        // Create the second matrix
        int[][] matrix2 = createMatrix(scanner, rows, columns, "Matrix 2");

        // Add the matrices
        int[][] sumMatrix = addMatrices(matrix1, matrix2);

        // Print the sum matrix
        System.out.println("Sum of matrices:");
        printMatrix(sumMatrix);
    }

    private static int[][] createMatrix(Scanner scanner, int rows, int columns, String matrixName) {
        System.out.println("Enter the elements of " + matrixName + ":");
        int[][] matrix = new int[rows][columns];
        for (int i = 0; i < rows; i++) {
            for (int j = 0; j < columns; j++) {
```

The screenshot shows a Microsoft Visual Studio Code interface with the following details:

- Title Bar:** IT IT3103.732874.2023.1.20215109.NguyenThiNhung
- Current File:** MatrixAddition.java
- Code Editor:** The main editor pane displays Java code for matrix addition. The code includes methods for reading matrices from the console, adding them, and printing the result.
- Syntax Highligting:** The code is color-coded according to Java syntax.
- Toolbars and Side Bars:** Standard VS Code toolbars and side bars are visible on the left and top.
- Status Bar:** Shows the file path (IT3103.732874.2023.1.20215109.NguyenThiNhung), encoding (CRLF), character encoding (UTF-8), and code space usage (4 spaces).

```
32     for (int i = 0; i < rows; i++) {
33         for (int j = 0; j < columns; j++) {
34             System.out.print(matrixName + "[" + (i + 1) + "][" + (j + 1) + "]: ");
35             matrix[i][j] = scanner.nextInt();
36         }
37     }
38     return matrix;
39 }
40
41 @
42 private static int[][] addMatrices(int[][] matrix1, int[][] matrix2) {
43     int rows = matrix1.length;
44     int columns = matrix1[0].length;
45
46     int[][] sumMatrix = new int[rows][columns];
47     for (int i = 0; i < rows; i++) {
48         for (int j = 0; j < columns; j++) {
49             sumMatrix[i][j] = matrix1[i][j] + matrix2[i][j];
50         }
51     }
52     return sumMatrix;
53 }
54 @
55 private static void printMatrix(int[][] matrix) {
56     int rows = matrix.length;
57     int columns = matrix[0].length;
58
59     for (int i = 0; i < rows; i++) {
60         for (int j = 0; j < columns; j++) {
61             System.out.print(matrix[i][j] + " ");
62         }
63         System.out.println();
64     }
65 }
```

Kết quả:

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

- Title Bar:** IT IT3103.732874.2023.1.20215109.NguyenThiNhung
- File List:** ChoosingOption.java, InputFromKeyboard.java, TriangleDisplay.java, ArraySorting.java, MatrixAddition.java (selected), DisplayMonthDays.java
- Run Tab:** MatrixAddition
- Output Window:** Displays the execution of the MatrixAddition.java program. The program prompts for matrix dimensions and elements, then calculates and prints the sum of two 2x3 matrices.

```
Enter the number of rows: 2
Enter the number of columns: 3
Enter the elements of Matrix 1:
Matrix 1[1][1]: 3
Matrix 1[1][2]: 2
Matrix 1[1][3]: 7
Matrix 1[2][1]: 1
Matrix 1[2][2]: 9
Matrix 1[2][3]: 5
Enter the elements of Matrix 2:
Matrix 2[1][1]: 2
Matrix 2[1][2]: 5
Matrix 2[1][3]: 6
Matrix 2[2][1]: 8
Matrix 2[2][2]: 1
Matrix 2[2][3]: 3
Sum of matrices:
5 7 13
9 10 8
Process finished with exit code 0
```