

**BÁO CÁO THỰC HÀNH LAP 1
LẬP TRÌNH HƯỚNG ĐỐI TƯỢNG**

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Các bài từ 2.2.1 đến 2.2.6

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 }
```

Figure 1: Source code 2.2.1

Kết quả

The screenshot shows a Java development environment with two files open: Main.java and HelloWorld.java. The code for HelloWorld.java is identical to the one shown in Figure 1. In the Run tab, the output window displays the following text:
 ↑ Nguyen Thi Nhụng - 20215109
 ↓ Xin chao
 ↓ cac ban!
 ↓ Hello world!
 Process finished with exit code 0

Figure 2: Run 2.2.1

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 }
```

Figure 3: Source code 2.2.2

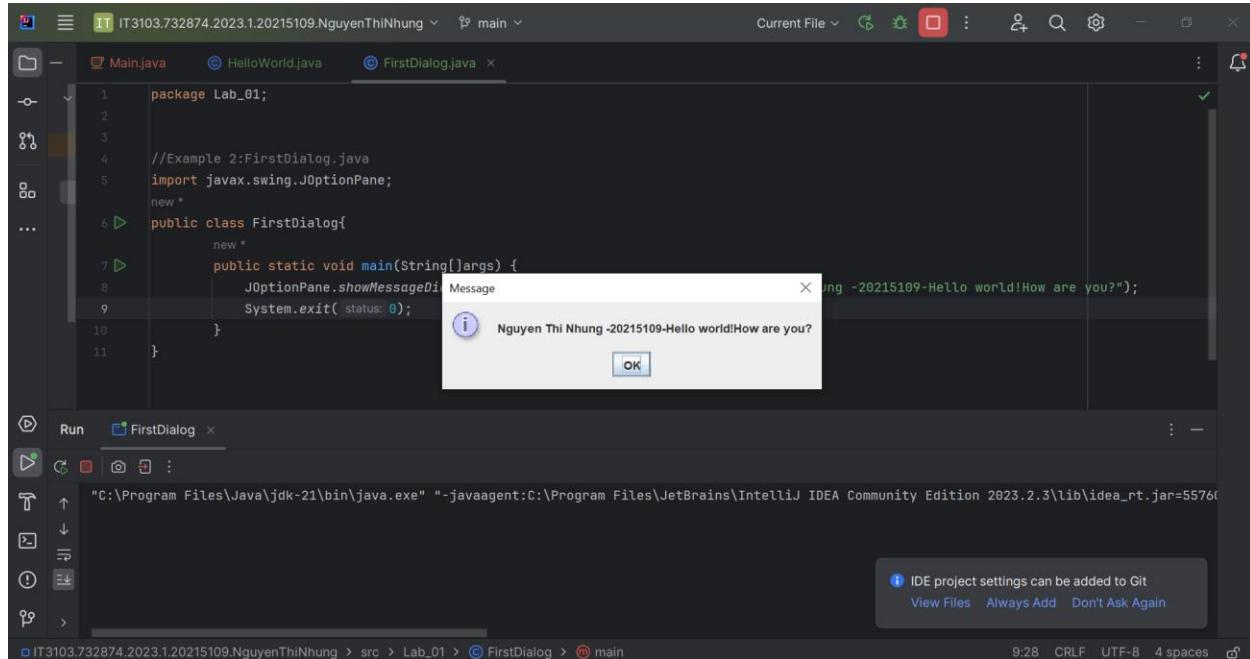


Figure 4: Run 2.2.2

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 }
```

Figure 5: Source code 2.2.3

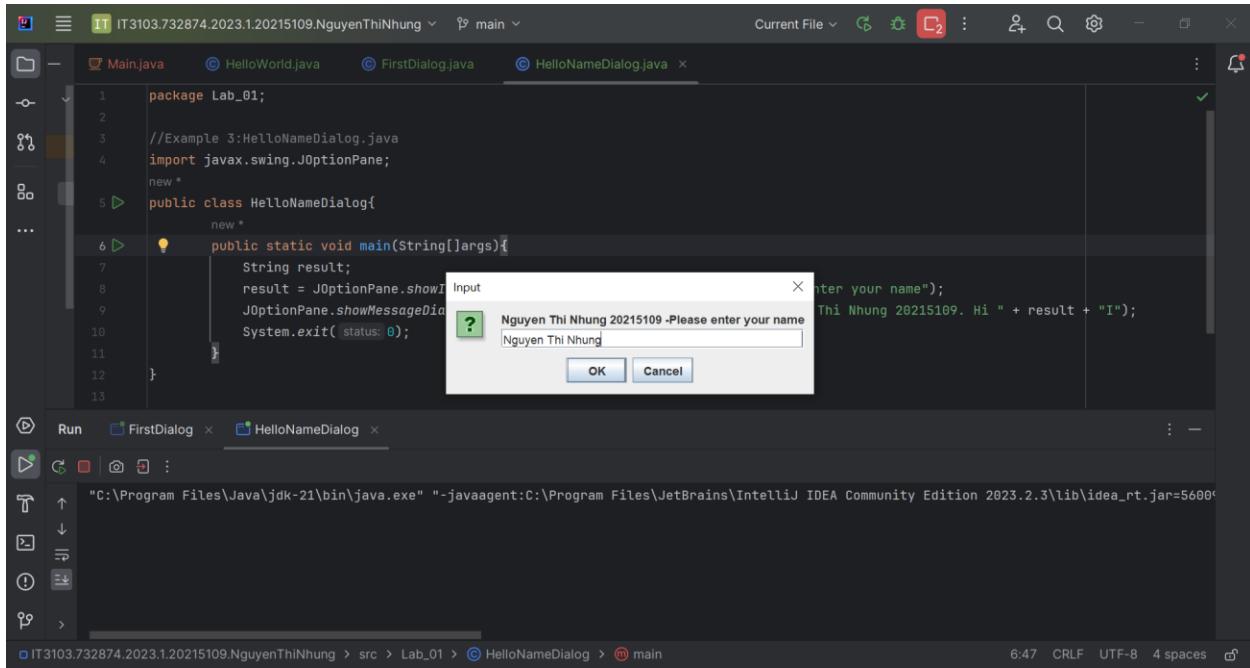


Figure 6: Run 2.2.3 (1)

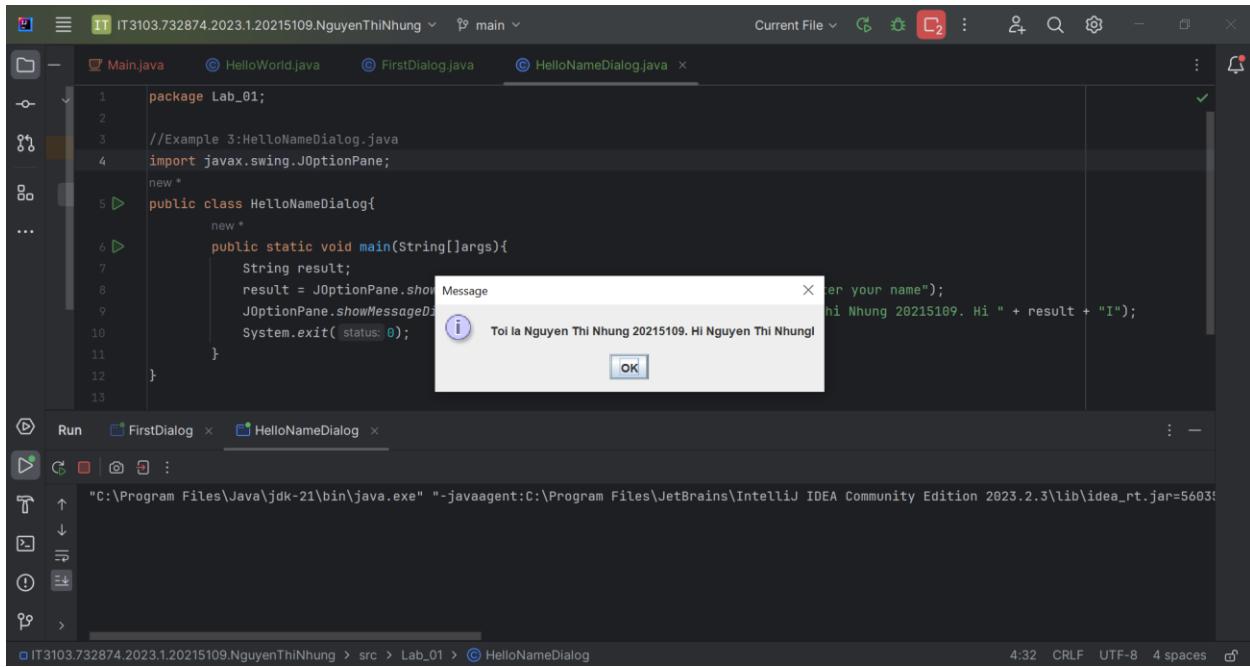


Figure 7: Run 2.2.3 (2)

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 }
```

Figure 8: Source code 2.2.4

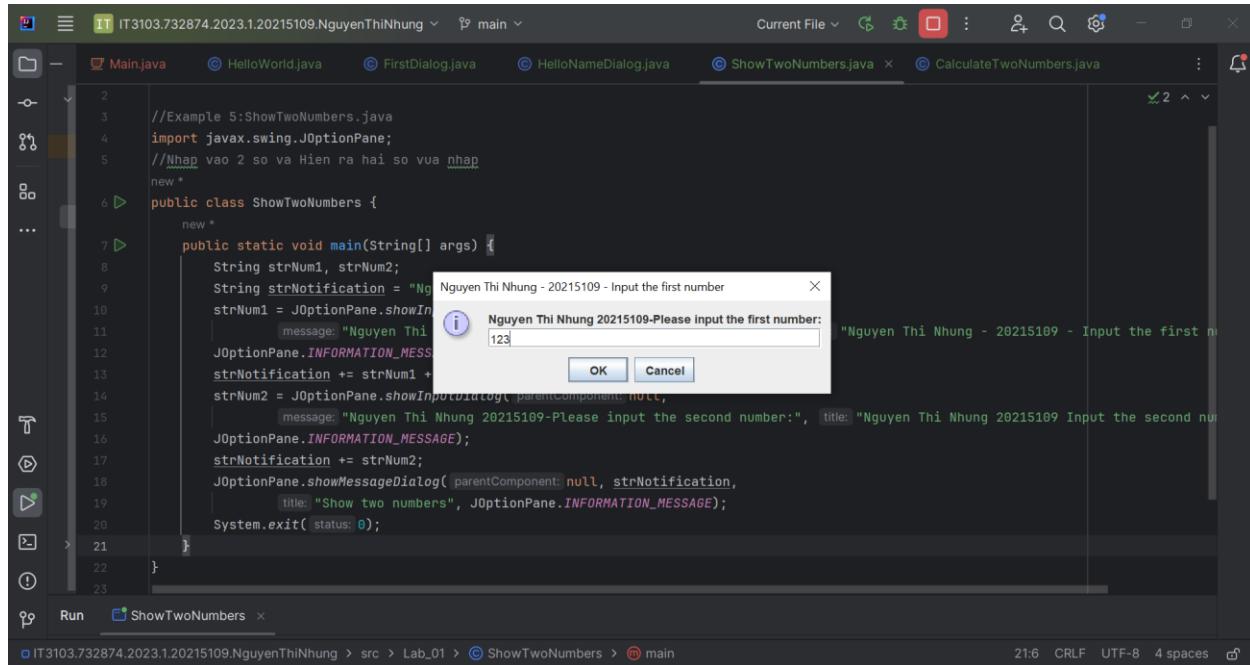


Figure 9: Run 2.2.4 (1)

The screenshot shows a Java IDE interface with the following details:

- Title Bar:** IT3103.732874.2023.1.20215109.NguyenThiNhung
- File Explorer:** Shows Main.java, HelloWorld.java, FirstDialog.java, HelloNameDialog.java, ShowTwoNumbers.java, and CalculateTwoNumbers.java.
- Code Editor:** Displays the ShowTwoNumbers.java code. The code imports javax.swing.JOptionPane and uses it to prompt the user for two numbers. A tooltip for the JOptionPane.showInputDialog method is visible.
- Run Tab:** Set to ShowTwoNumbers.
- Output Window:** Shows the command line output: "IT3103.732874.2023.1.20215109.NguyenThiNhung > src > Lab_01 > ShowTwoNumbers > main".
- Status Bar:** Shows the time as 21:6, file encoding as CRLF, and code style as 4 spaces.
- Dialog Box:** A JOptionPane input dialog is displayed, asking for the second number. The title is "Nguyen Thi Nhung 20215109-Please input the second number". The message field contains "Nguyen Thi Nhung 20215109 Input the second number". The input field has the value "45". Buttons OK and Cancel are visible.

Figure 10: Run 2.2.4 (2)

The screenshot shows a Java IDE interface with the following details:

- Title Bar:** IT3103.732874.2023.1.20215109.NguyenThiNhung
- File Explorer:** Shows Main.java, HelloWorld.java, FirstDialog.java, HelloNameDialog.java, ShowTwoNumbers.java, and CalculateTwoNumbers.java.
- Code Editor:** Displays the ShowTwoNumbers.java code. The code imports javax.swing.JOptionPane and uses it to prompt the user for two numbers. A tooltip for the JOptionPane.showInputDialog method is visible.
- Run Tab:** Set to ShowTwoNumbers.
- Output Window:** Shows the command line output: "IT3103.732874.2023.1.20215109.NguyenThiNhung > src > Lab_01 > ShowTwoNumbers > main".
- Status Bar:** Shows the time as 21:6, file encoding as CRLF, and code style as 4 spaces.
- Dialog Box:** A JOptionPane message dialog is displayed, showing the result of the user input. The title is "Nguyen Thi Nhung 20215109-You've just entered: 123 and 45". The message field contains "Nguyen Thi Nhung - 20215109 - Input the first number: 123 and 45". Buttons OK and Cancel are visible.

Figure 11: Run 2.2.4 (3)

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: "Nguyen Thi Nhung 20215109-Please input the first number:",
        title: "Nguyen Thi Nhung - 20215109 - Input the first number",
        JOptionPane.INFORMATION_MESSAGE);
    double num1 = Double.parseDouble(strNum1);
    strNum2 = JOptionPane.showInputDialog( parentComponent: null,
        message: "Nguyen Thi Nhung 20215109-Please input the second number:",
        title: "Nguyen Thi Nhung - 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 = "Nguyen Thi Nhung 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);
    System.exit(0);
}
```

Figure 12: Source code 2.2.5

Kết quả:

Figure 13: Run 2.2.5 (1)

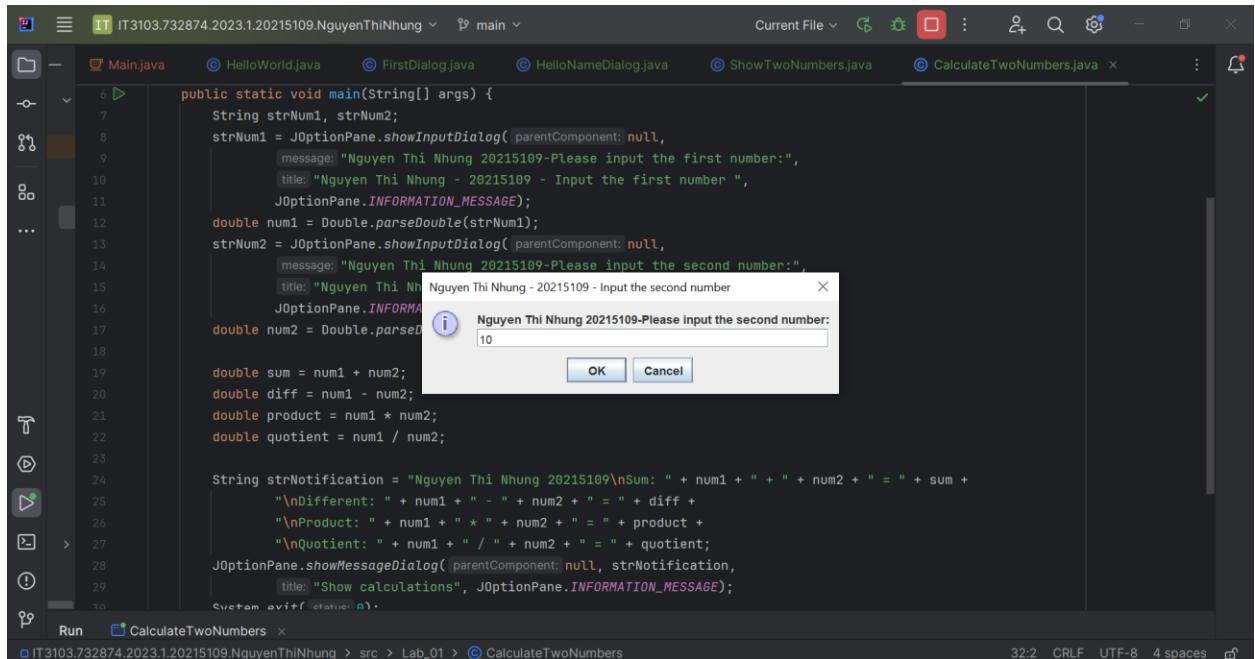


Figure 14: Run 2.2.5 (2)

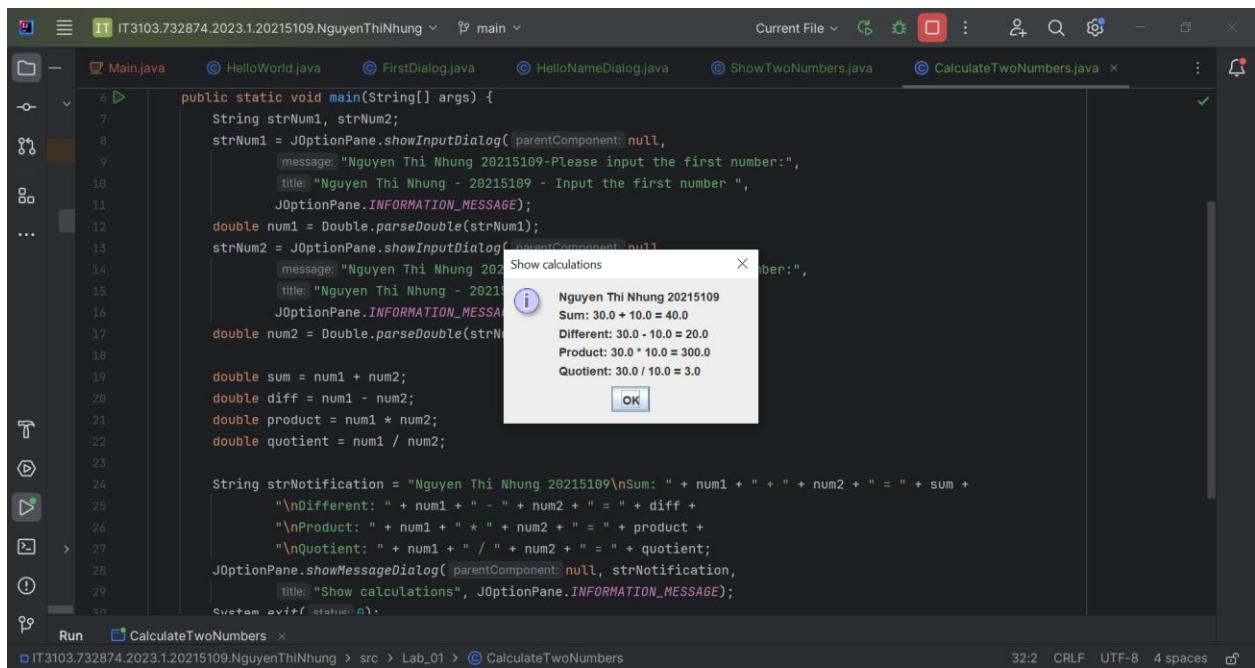


Figure 15: Run 2.2.5 (3)

2.2.6 Write a program to solve the equation:

Mã nguồn:

```

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

```

Figure 16: Source code 2.2.6 (1)

```

32 //Giải phương trình 1 ẩn bậc 1
33 1 usage ▲ nhungnvn
34 public static void solveLinearEquation(Scanner scanner) {
35     String strNum1, strNum2;
36     strNum1 = JOptionPane.showInputDialog( parentComponent: null,
37                                         message: "Nguyễn Thị Nhụng 20215109 - Equation: ax + b = 0 (a ≠ 0)" +
38                                         "\nPlease input the coefficient 'a' for the linear equation:",
39                                         title: "Nguyễn Thị Nhụng 20215109 - Input the coefficient 'a' ",
40                                         JOptionPane.INFORMATION_MESSAGE); //Nhập hệ số a
41     while (strNum1.equals("0")) {
42         strNum1 = JOptionPane.showInputDialog( parentComponent: null,
43                                         message: "Nguyễn Thị Nhụng 20215109 - Equation: ax + b = 0 (a ≠ 0)" +
44                                         "\nPlease input the coefficient 'a'(a ≠ 0) for the linear equation:",
45                                         title: "Nguyễn Thị Nhụng 20215109 - Input the coefficient 'a' ",
46                                         JOptionPane.INFORMATION_MESSAGE); //Nhập lại hệ số a
47     } // nếu a = 0 thì nhập lại
48     double a = Double.parseDouble(strNum1); //chuyển a sang kiểu double
49     strNum2 = JOptionPane.showInputDialog( parentComponent: null,
50                                         message: "Nguyễn Thị Nhụng 20215109 - Equation: ax + b = 0" +
51                                         "\nPlease input the coefficient 'b' for the linear equation:",
52                                         title: "Nguyễn Thị Nhụng 20215109 - Input the coefficient 'b' ",
53                                         JOptionPane.INFORMATION_MESSAGE); //Nhập hệ số b
54     double b = Double.parseDouble(strNum2); //chuyển b sang kiểu double
55
56     String strNotification = "Nguyễn Thị Nhụng 20215109 - Equation: " + a + " x + " + b + " = 0 ";
57     double solution = -b / a;
58     strNotification += "\nSolution: x = " + solution;
59     JOptionPane.showMessageDialog( parentComponent: null, strNotification,
60                                   title: "Show Solution", JOptionPane.INFORMATION_MESSAGE);
61 }

```

Figure 17: Source code 2.2.6 (2)

```

51 //Giải hệ 2 ẩn 2 phương trình
52 //usage : ~ nhungngn*
53 public static void solveLinearSystem(Scanner scanner) {
54     String strNum1, strNum2, strNum3, strNum4, strNum5, strNum6;
55     strNum1 = JOptionPane.showInputDialog( parentComponent: null,
56                                         message: "Nguyễn Thị Nhung 20215109 \nEquation: a11x1 + a12x2 = b1; a21x1 + a22x2 = b2" +
57                                         "\nPlease input the coefficient 'a11' for equation 1:",
58                                         title: "Nguyễn Thị Nhung 20215109 - Input the coefficient 'a11' ",
59                                         JOptionPane.INFORMATION_MESSAGE); // nhập a11
60     double a11 = Double.parseDouble(strNum1);
61     strNum2 = JOptionPane.showInputDialog( parentComponent: null,
62                                         message: "Nguyễn Thị Nhung 20215109 \nEquation: a11x1 + a12x2 = b1; a21x1 + a22x2 = b2" +
63                                         "\nPlease input the coefficient 'a12' for equation 1:",
64                                         title: "Nguyễn Thị Nhung 20215109 - Input the coefficient 'a12' ",
65                                         JOptionPane.INFORMATION_MESSAGE); //nhập a12
66     double a12 = Double.parseDouble(strNum2);
67     strNum3 = JOptionPane.showInputDialog( parentComponent: null,
68                                         message: "Nguyễn Thị Nhung 20215109 \nEquation: a11x1 + a12x2 = b1; a21x1 + a22x2 = b2" +
69                                         "\nPlease input the coefficient 'b1' for equation 1:",
70                                         title: "Nguyễn Thị Nhung 20215109 - Input the coefficient 'b1' ",
71                                         JOptionPane.INFORMATION_MESSAGE); //nhập b1
72     double b1 = Double.parseDouble(strNum3);
73     strNum4 = JOptionPane.showInputDialog( parentComponent: null,
74                                         message: "Nguyễn Thị Nhung 20215109 \nEquation: a11x1 + a12x2 = b1; a21x1 + a22x2 = b2" +
75                                         "\nPlease input the coefficient 'a21' for equation 2:",
76                                         title: "Nguyễn Thị Nhung 20215109 - Input the coefficient 'a21' ",
77                                         JOptionPane.INFORMATION_MESSAGE); //nhập a21
78     double a21 = Double.parseDouble(strNum4);
79     strNum5 = JOptionPane.showInputDialog( parentComponent: null,
80                                         message: "Nguyễn Thị Nhung 20215109 \nEquation: a11x1 + a12x2 = b1; a21x1 + a22x2 = b2" +
81                                         "\nPlease input the coefficient 'a22' for equation 2:",
82                                         title: "Nguyễn Thị Nhung 20215109 - Input the coefficient 'a22' "
83                                         JOptionPane.INFORMATION_MESSAGE);
84 }

```

Figure 18: Source code 2.2.6 (3)

```

91                                         title: "Nguyễn Thị Nhung 20215109 - Input the coefficient 'a22' ",
92                                         JOptionPane.INFORMATION_MESSAGE); //nhập a22
93     double a22 = Double.parseDouble(strNum5);
94     strNum6 = JOptionPane.showInputDialog( parentComponent: null,
95                                         message: "Nguyễn Thị Nhung 20215109 \nEquation: a11x1 + a12x2 = b1; a21x1 + a22x2 = b2" +
96                                         "\nPlease input the coefficient 'b2' for equation 2:",
97                                         title: "Nguyễn Thị Nhung 20215109 - Input the coefficient 'b2' ",
98                                         JOptionPane.INFORMATION_MESSAGE); //nhập b2
99     double b2 = Double.parseDouble(strNum6);
100
101     //tính các định thức a, d1, d2
102     double d = a11 * a22 - a21 * a12;
103     double d1 = b1 * a22 - b2 * a12;
104     double d2 = a11 * b2 - a21 * b1;
105
106     String strNotification = "Nguyễn Thị Nhung 20215109 - Equation:\n" + a11 + " x1 + " + a12 + " x2 = " + b1 + ";" + a21 + " x1 + " + a22 + " x2 = " + b2;
107     if (d != 0) { //nếu d khác 0 thì tính 2 nghiệm
108         double x1 = d1 / d;
109         double x2 = d2 / d;
110         strNotification += "\nSolution: x1 = " + x1 + ", x2 = " + x2;
111     } else {
112         if (d1 == 0 && d2 == 0) { //nếu d = d1 = d2 = 0 thì hpt vô số nghiệm
113             strNotification += "\nInfinite solutions";
114         } else { //nếu d = 0 nhưng d1 hoặc d2 khác 0 thì hpt vô nghiệm
115             strNotification += "\nNo solution";
116         }
117     }
118     JOptionPane.showMessageDialog( parentComponent: null, strNotification,
119                                         title: "Show Solution", JOptionPane.INFORMATION_MESSAGE);
120 }

```

Figure 19: Source code 2.2.6 (4)

```

121 // giải phương trình 1 ẩn bậc 2
122 1 usage ± nhungngn *
123 public static void solveQuadraticEquation(Scanner scanner) {
124     String strNum1, strNum2, strNum3;
125     JOptionPane.showInputDialog( parentComponent: null,
126         message: "Nguyễn Thị Nhưng 20215109 - Equation: ax^2 + bx + c = 0" +
127             "\nPlease input the coefficient 'a' for the quadratic equation:",
128             title: "Nguyễn Thị Nhưng 20215109 - Input the coefficient 'a' ",
129             JOptionPane.INFORMATION_MESSAGE); // nhập hệ số a
130     while (strNum1.equals("0")){
131         strNum1 = JOptionPane.showInputDialog( parentComponent: null,
132             message: "Nguyễn Thị Nhưng 20215109 - Equation: ax^2 + bx + c = 0" +
133                 "\nPlease input the coefficient 'a' (a ≠ 0) for the quadratic equation:",
134                 title: "Nguyễn Thị Nhưng 20215109 - Input the coefficient 'a' ",
135                 JOptionPane.INFORMATION_MESSAGE);
136     } // nếu a=0 thì nhập lại
137     double a = Double.parseDouble(strNum1);
138     strNum2 = JOptionPane.showInputDialog( parentComponent: null,
139         message: "Nguyễn Thị Nhưng 20215109 - Equation: ax^2 + bx + c = 0" +
140             "\nPlease input the coefficient 'b' for the quadratic equation:",
141             title: "Nguyễn Thị Nhưng 20215109 - Input the coefficient 'b' ",
142             JOptionPane.INFORMATION_MESSAGE); // nhập hệ số b
143     double b = Double.parseDouble(strNum2);
144     strNum3 = JOptionPane.showInputDialog( parentComponent: null,
145         message: "Nguyễn Thị Nhưng 20215109 - Equation: ax^2 + bx + c = 0" +
146             "\nPlease input the coefficient 'c' for the quadratic equation:",
147             title: "Nguyễn Thị Nhưng 20215109 - Input the coefficient 'c' ",
148             JOptionPane.INFORMATION_MESSAGE); // nhập hệ số c
149     double c = Double.parseDouble(strNum3);
150     String strNotification = "Nguyễn Thị Nhưng 20215109 \nEquation: " + a + " x^2 + " + b + " x " + c + " = 0 ";
151     double discriminant = b * b - 4 * a * c; // tính delta
152     if (discriminant > 0) { // nếu delta > 0 thì tính 2 nghiệm
153         double root1 = (-b + Math.sqrt(discriminant)) / (2 * a);
154         double root2 = (-b - Math.sqrt(discriminant)) / (2 * a);
155         strNotification += "\nRoots: x1 = " + root1 + ", x2 = " + root2;
156     } else if (discriminant == 0) { //nếu delta = 0 thì tính nghiệm kép
157         double root = -b / (2 * a);
158         strNotification += "\nDouble root: x = " + root;
159     } else { //nếu delta < 0 thì pt vô nghiệm
160         strNotification += "\nNo real roots";
161     }
162     JOptionPane.showMessageDialog( parentComponent: null, strNotification,
163         title: "Show Solution", JOptionPane.INFORMATION_MESSAGE);
164 }

```

Figure 20: Source code 2.2.6 (5)

```

151 if (discriminant > 0) { // nếu delta > 0 thì tính 2 nghiệm
152     double root1 = (-b + Math.sqrt(discriminant)) / (2 * a);
153     double root2 = (-b - Math.sqrt(discriminant)) / (2 * a);
154     strNotification += "\nRoots: x1 = " + root1 + ", x2 = " + root2;
155 } else if (discriminant == 0) { //nếu delta = 0 thì tính nghiệm kép
156     double root = -b / (2 * a);
157     strNotification += "\nDouble root: x = " + root;
158 } else { //nếu delta < 0 thì pt vô nghiệm
159     strNotification += "\nNo real roots";
160 }
161 JOptionPane.showMessageDialog( parentComponent: null, strNotification,
162         title: "Show Solution", JOptionPane.INFORMATION_MESSAGE);
163 }
164 }

```

Figure 21: Source code 2.2.6 (6)

Kết quả:

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

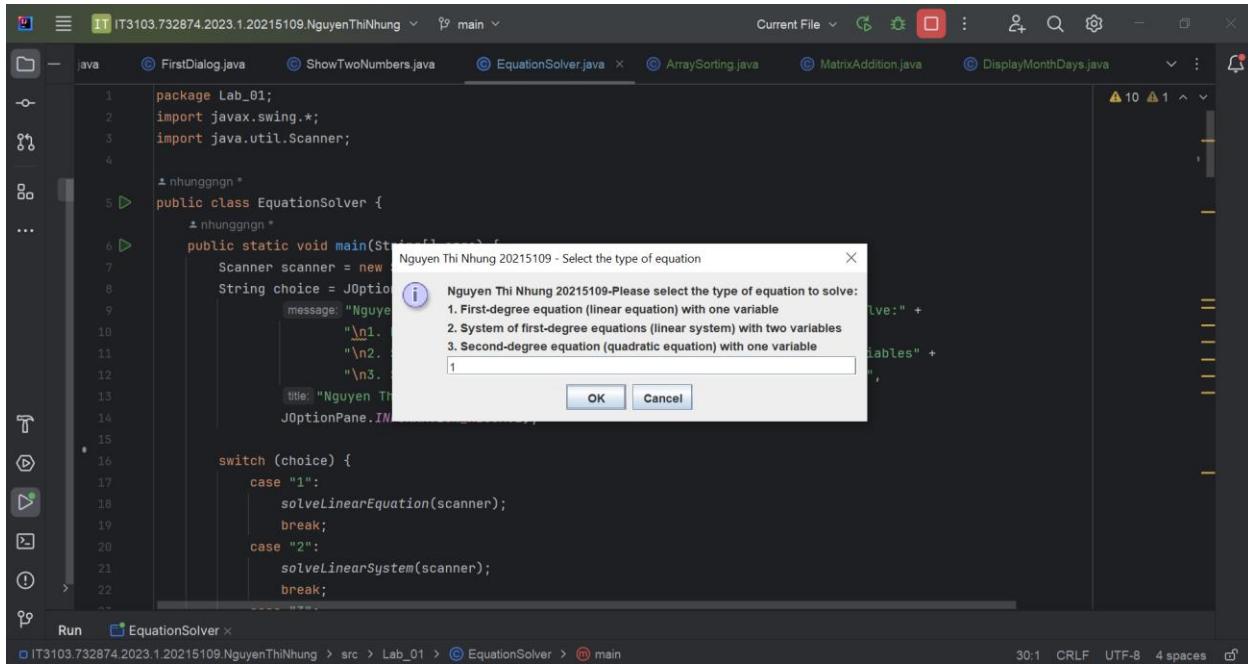


Figure 22: Run 2.2.6 (1.1)

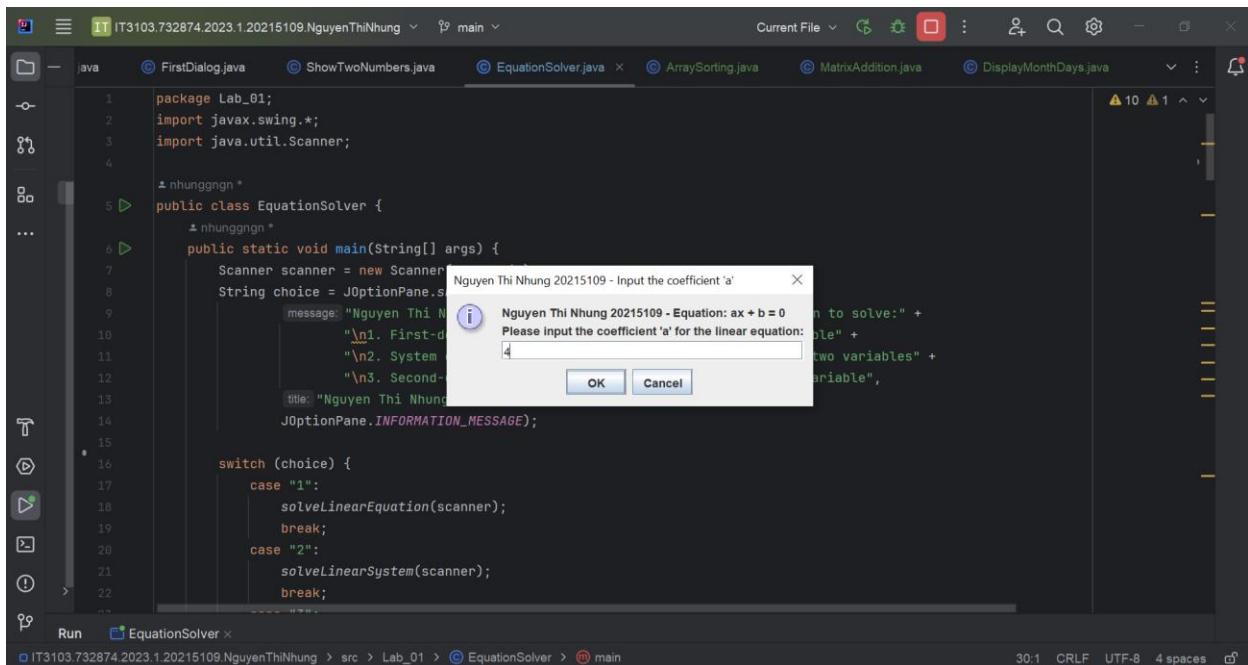


Figure 23: Run 2.2.6 (1.2)

The screenshot shows a Java IDE interface with several files listed in the sidebar: FirstDialog.java, ShowTwoNumbers.java, EquationSolver.java (which is the current file), ArraySorting.java, MatrixAddition.java, and DisplayMonthDays.java. The code in EquationSolver.java is as follows:

```

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

```

A modal dialog box titled "Nguyễn Thị Nhụng 20215109 - Input the coefficient 'b'" is displayed. It contains the message: "Nguyễn Thị Nhụng 20215109 - Equation: ax + b = 0", "Please input the coefficient 'b' for the linear equation:", and a text input field containing the value "6". There are "OK" and "Cancel" buttons at the bottom of the dialog.

Figure 24: Run 2.2.6 (1.3)

The screenshot shows the same Java IDE interface as Figure 24. The code in EquationSolver.java has been modified to include a solution for the first-degree equation:

```

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

```

A modal dialog box titled "Show Solution" is displayed. It contains the message: "Nguyễn Thị Nhụng 20215109 - Equation: 4.0 x + 6.0 = 0" and "Solution: x = -1.5". There is an "OK" button at the bottom of the dialog.

Figure 25: Run 2.2.6 (1.4)

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

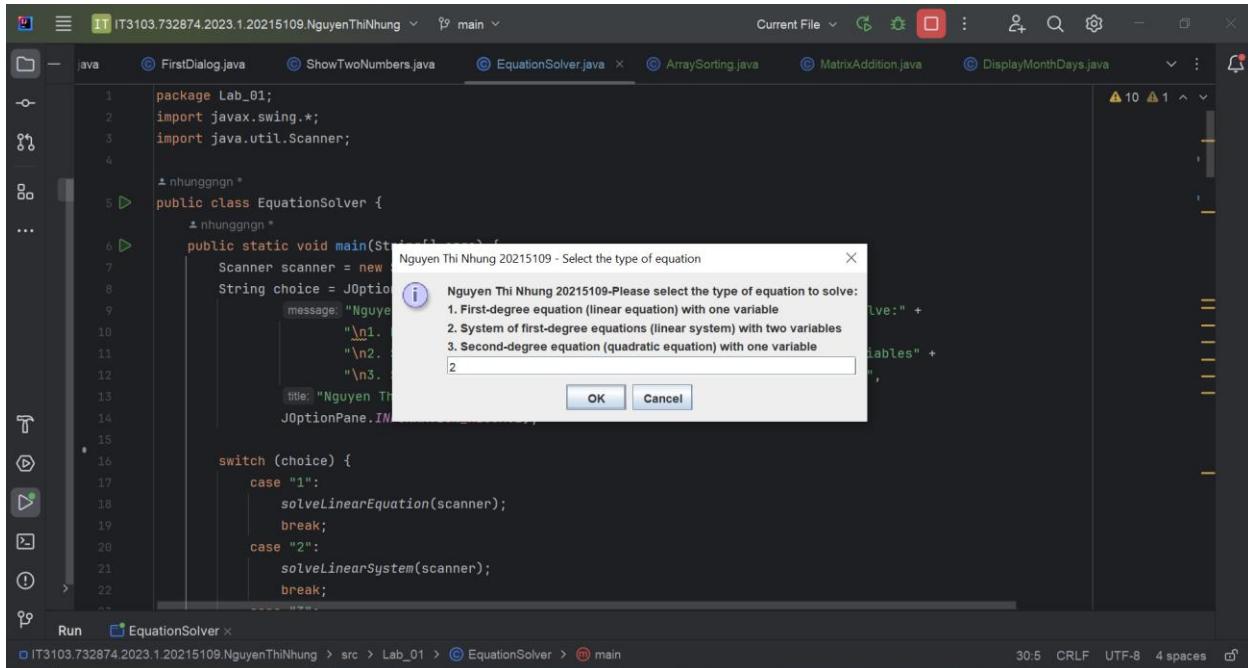


Figure 26: Run 2.2.6 (2.1)

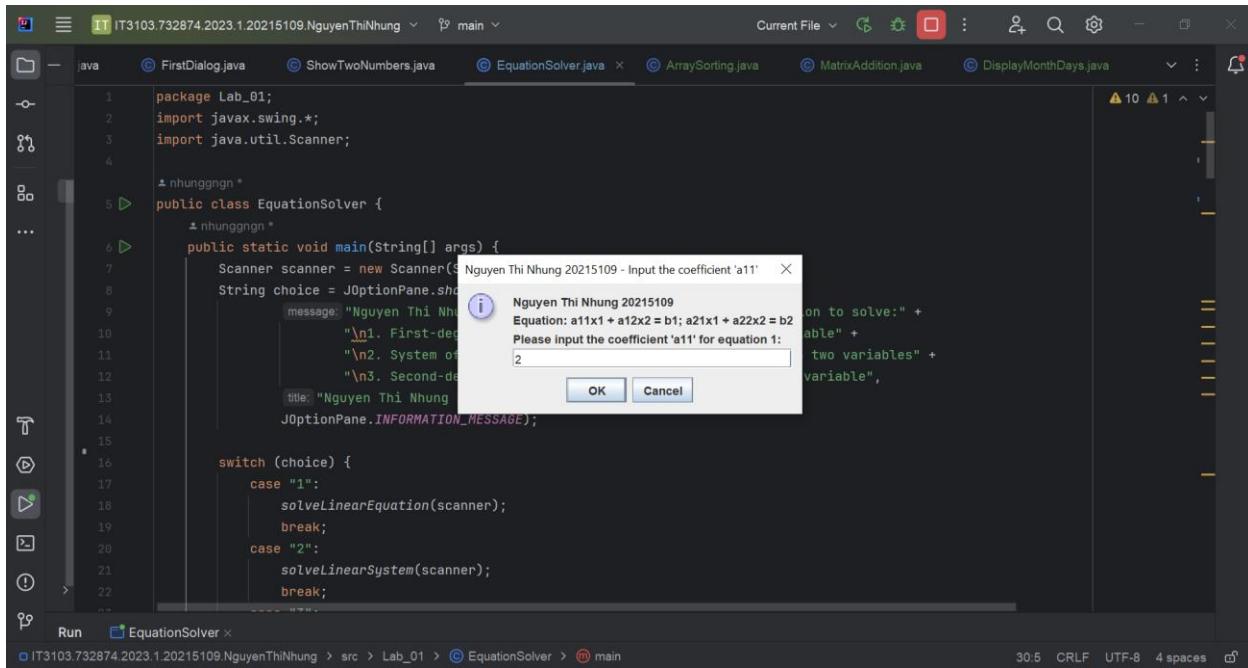


Figure 27: Run 2.2.6 (2.2)

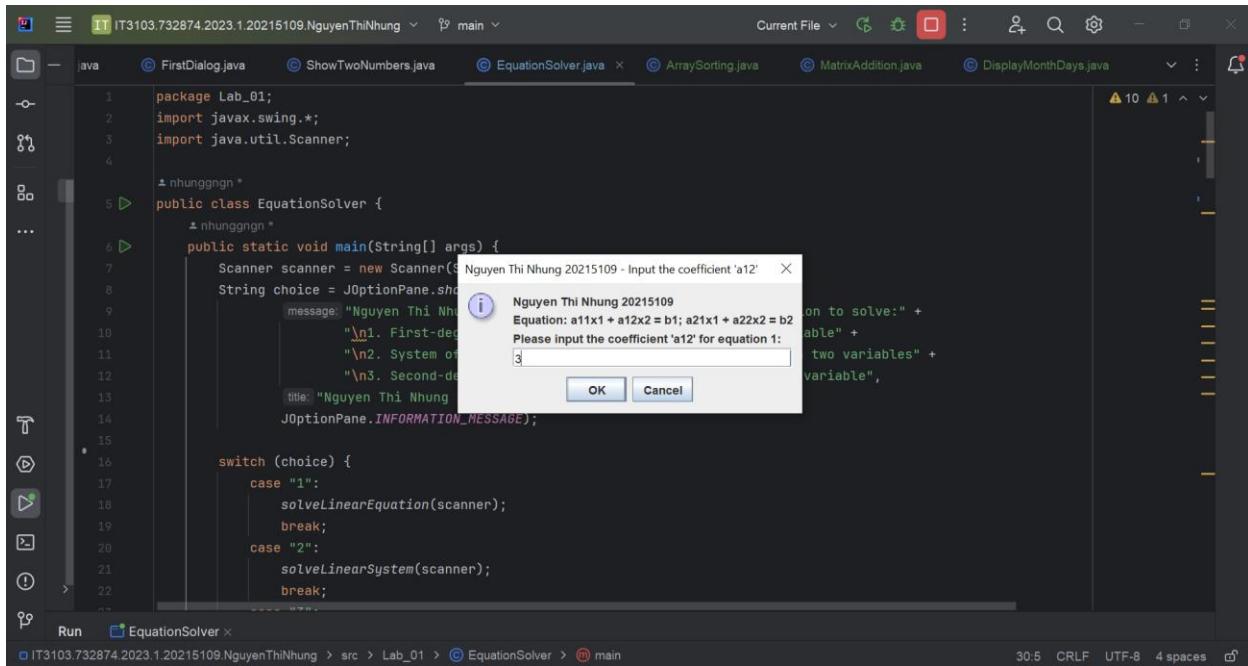


Figure 28: Run 2.2.6 (2.3)

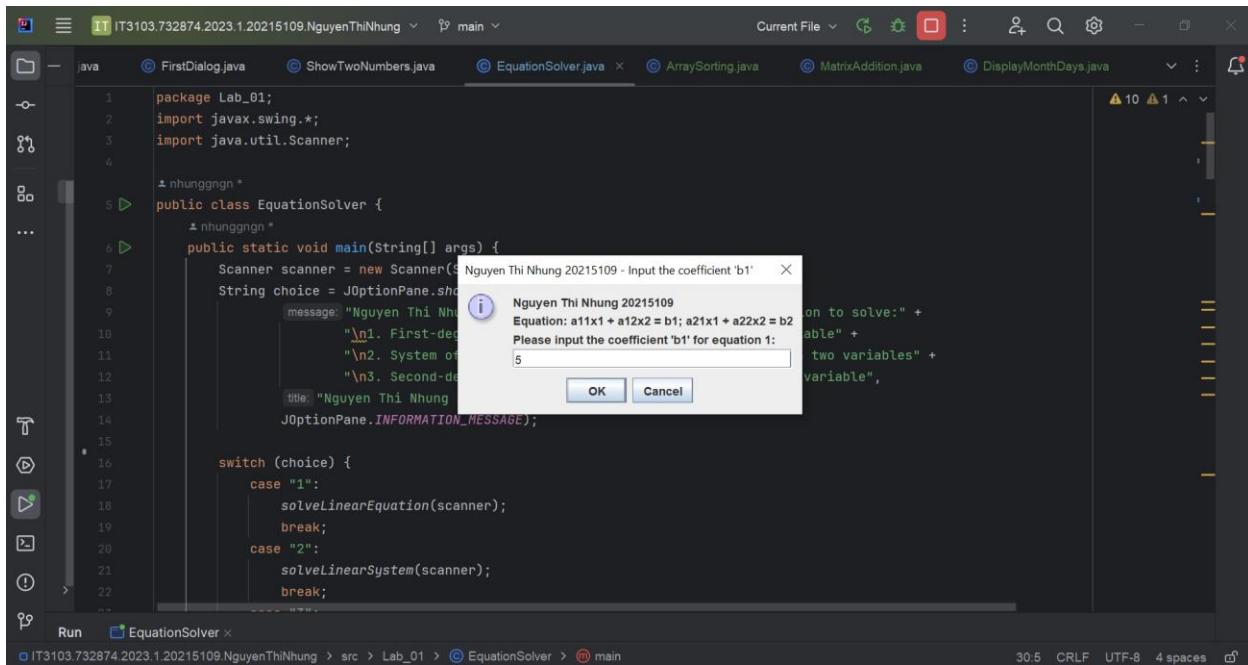


Figure 29: Run 2.2.6 (2.4)

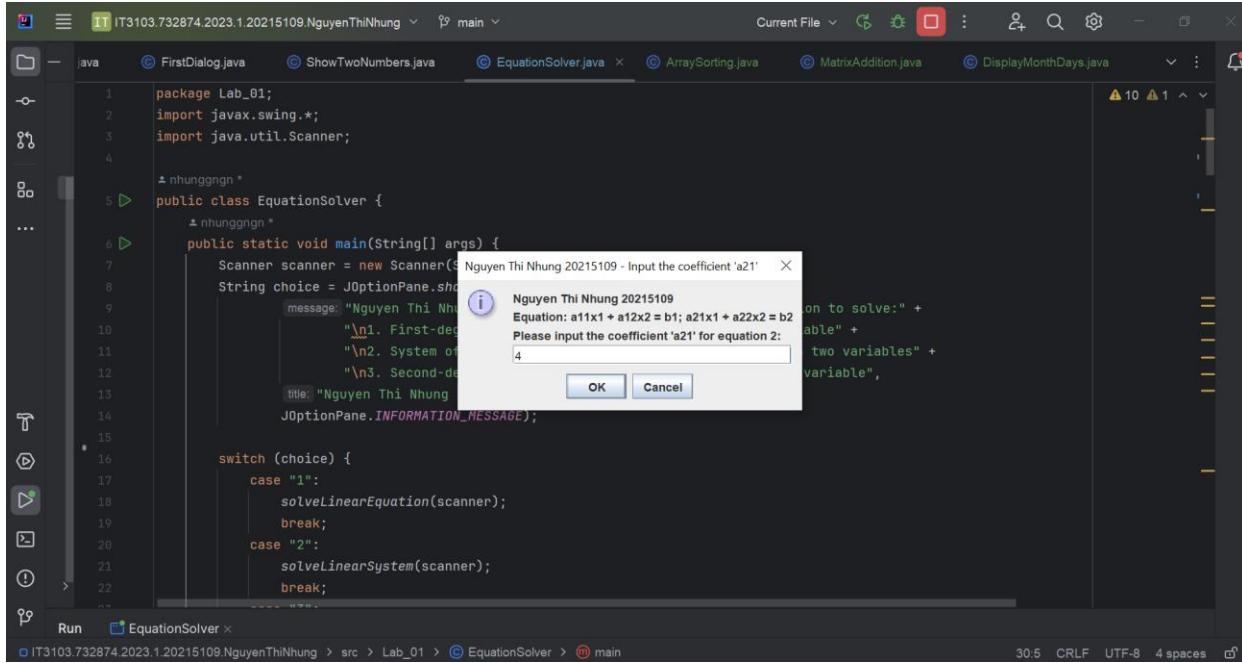


Figure 30: Run 2.2.6 (2.5)

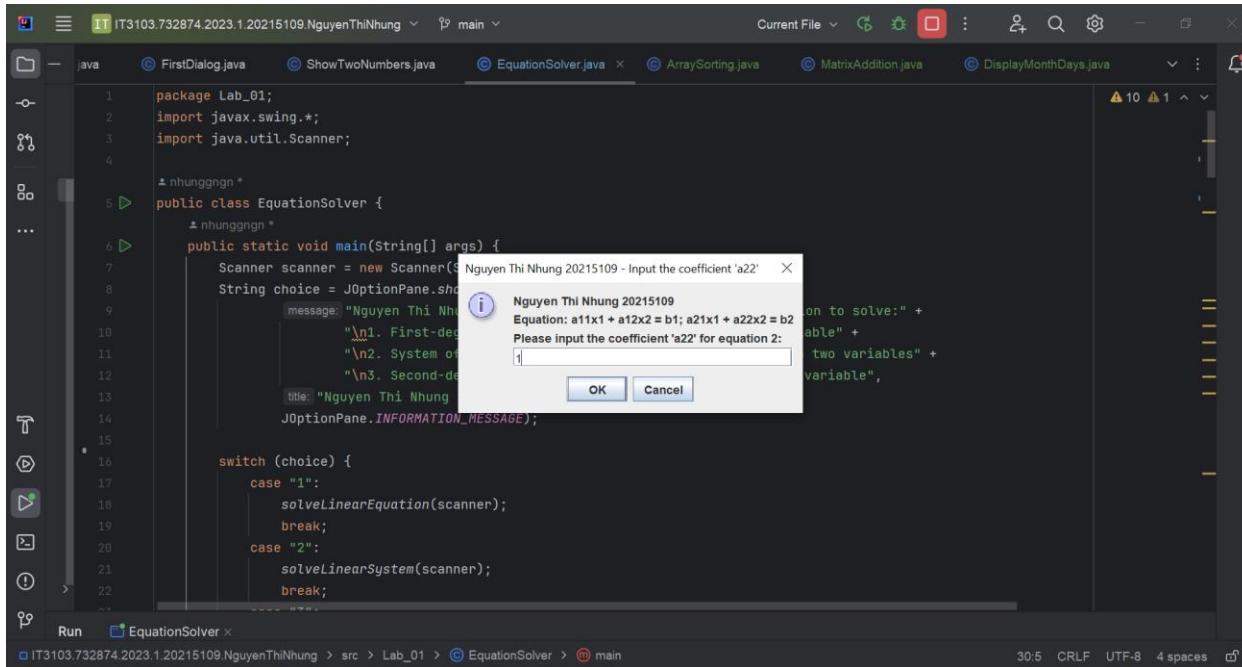


Figure 31: Run 2.2.6 (2.6)

The screenshot shows a Java IDE interface with several files listed in the left sidebar: FirstDialog.java, ShowTwoNumbers.java, EquationSolver.java (the current file), ArraySorting.java, MatrixAddition.java, and DisplayMonthDays.java. The code in EquationSolver.java is as follows:

```

1 package Lab_01;
2 import javax.swing.*;
3 import java.util.Scanner;
4
5 /**
6  * nhunggnn
7  */
8 public class EquationSolver {
9     /**
10      * nhunggnn
11     */
12     public static void main(String[] args) {
13         Scanner scanner = new Scanner("Nguyen Thi Nhung 20215109 - Input the coefficient 'b2'");
14         String choice = JOptionPane.showInputDialog("Nguyen Thi Nhung 20215109", "Equation: a1x1 + a1x2 = b1; a2x1 + a2x2 = b2", "Please input the coefficient 'b2' for equation 2:", "3");
15
16         switch (choice) {
17             case "1":
18                 solveLinearEquation(scanner);
19                 break;
20             case "2":
21                 solveLinearSystem(scanner);
22                 break;
23         }
24     }
25
26     private void solveLinearEquation(Scanner scanner) {
27         double a1 = scanner.nextDouble();
28         double a2 = scanner.nextDouble();
29         double b1 = scanner.nextDouble();
30         double b2 = scanner.nextDouble();
31
32         double x1 = (b2 - a2 * b1) / (a1 * a2 - a2 * a1);
33         double x2 = (b1 - a1 * b2) / (a1 * a2 - a2 * a1);
34
35         System.out.println("Solution: x1 = " + x1 + ", x2 = " + x2);
36     }
37
38     private void solveLinearSystem(Scanner scanner) {
39         double a11 = scanner.nextDouble();
40         double a12 = scanner.nextDouble();
41         double a21 = scanner.nextDouble();
42         double a22 = scanner.nextDouble();
43         double b1 = scanner.nextDouble();
44         double b2 = scanner.nextDouble();
45
46         double x1 = (b2 * a11 - b1 * a12) / (a11 * a22 - a12 * a21);
47         double x2 = (b1 * a22 - b2 * a21) / (a11 * a22 - a12 * a21);
48
49         System.out.println("Solution: x1 = " + x1 + ", x2 = " + x2);
50     }
51 }

```

A JOptionPane dialog box is displayed, asking for the coefficient 'b2' for equation 2. The user has entered '3'. The dialog title is "Nguyen Thi Nhung 20215109". The message text is "Equation: a1x1 + a1x2 = b1; a2x1 + a2x2 = b2" followed by "Please input the coefficient 'b2' for equation 2:" and an input field containing '3'. Buttons for "OK" and "Cancel" are visible.

Figure 32: Run 2.2.6 (2.7)

The screenshot shows the same Java IDE interface as Figure 32. The code in EquationSolver.java is identical. A JOptionPane dialog box is displayed, asking for the coefficient 'b2' for equation 2. The user has entered '3'. The dialog title is "Nguyen Thi Nhung 20215109 - Equation: 2.0 x1 + 3.0 x2 = 5.0; 4.0 x1 + 1.0 x2 = 3.0". The message text is "Please input the coefficient 'b2' for equation 2:" and an input field containing '3'. Buttons for "OK" and "Cancel" are visible.

Figure 33: Run 2.2.6 (2.8)

- The second-degree equation with one variable:

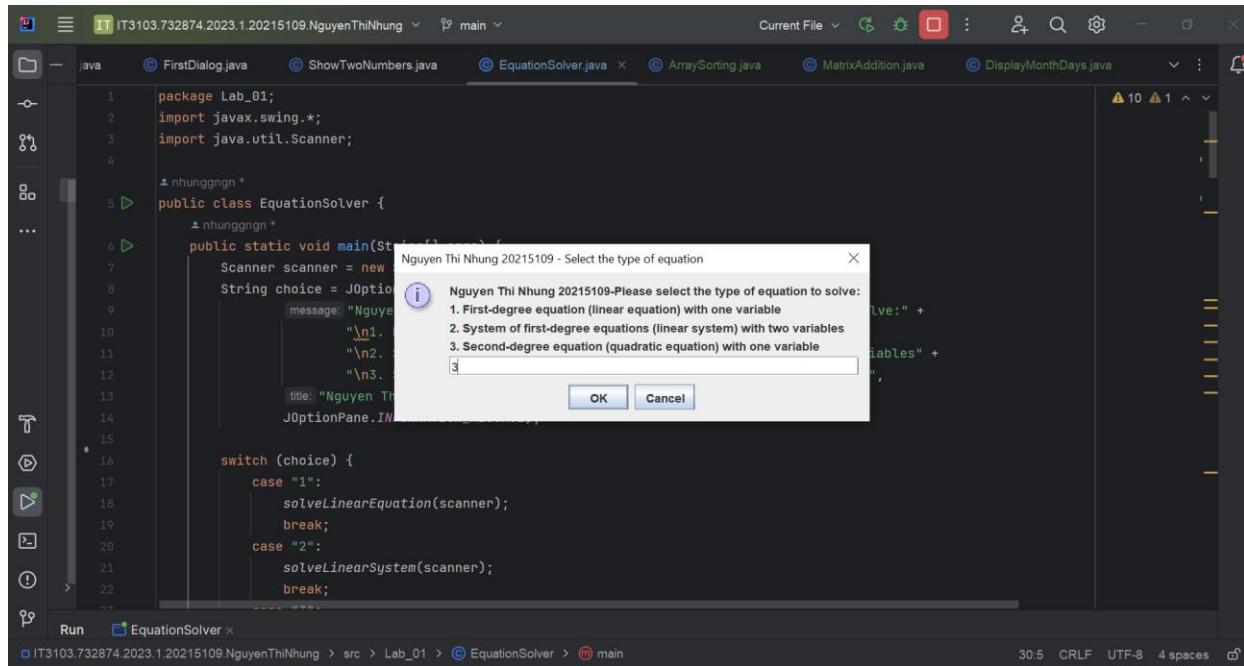


Figure 34: Run 2.2.6 (3.1)

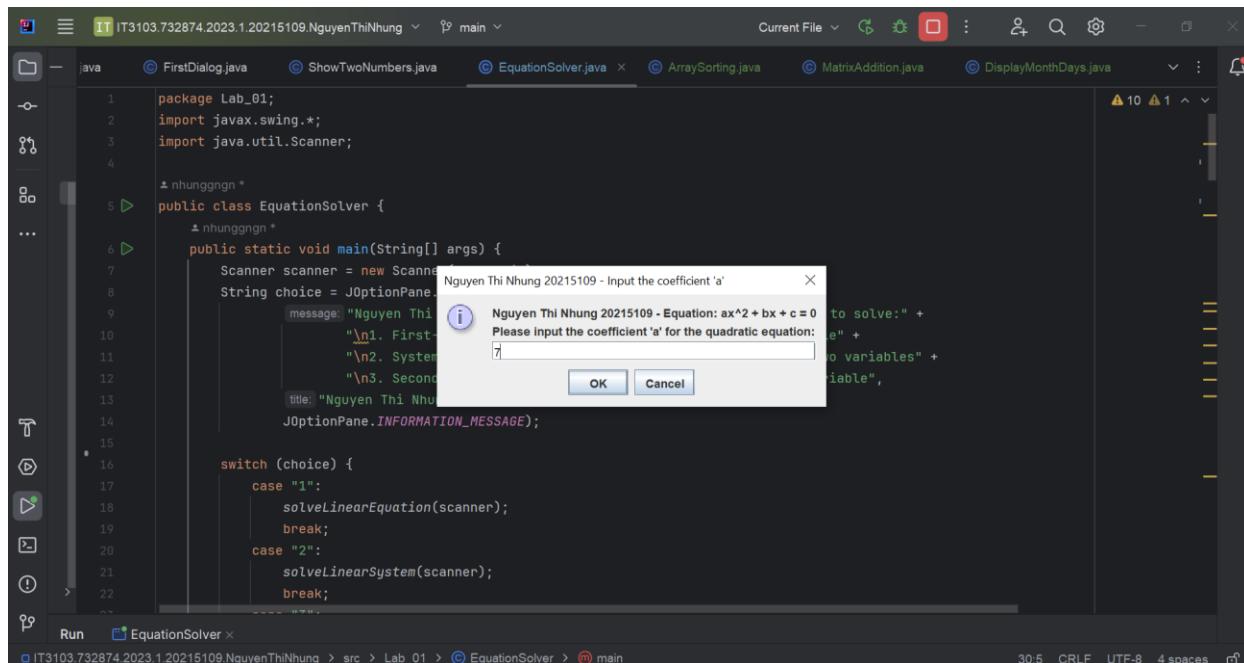


Figure 35: Run 2.2.6 (3.2)

The screenshot shows a Java code editor with several files listed in the sidebar: FirstDialog.java, ShowTwoNumbers.java, EquationSolver.java (the current file), ArraySorting.java, MatrixAddition.java, and DisplayMonthDays.java. The EquationSolver.java file contains code for solving quadratic equations. A JOptionPane dialog box is displayed in the foreground, prompting the user to input the coefficient 'b'. The dialog has the title "Nguyen Thi Nhung 20215109 - Input the coefficient 'b'" and the message "Please input the coefficient 'b' for the quadratic equation: ax^2 + bx + c = 0". The input field contains the value 5.

```

1 package Lab_01;
2 import javax.swing.*;
3 import java.util.Scanner;
4
5 /**
6  * nhungnngn
7  */
8 public class EquationSolver {
9     /**
10      * nhungnngn
11     */
12     public static void main(String[] args) {
13         Scanner scanner = new Scanner(System.in);
14         String choice = JOptionPane.showInputDialog("Nguyen Thi Nhung 20215109 - Input the coefficient 'b'", "5");
15         int b = Integer.parseInt(choice);
16         switch (choice) {
17             case "1":
18                 solveLinearEquation(scanner);
19                 break;
20             case "2":
21                 solveLinearSystem(scanner);
22                 break;
23         }
24     }
25     private static void solveLinearEquation(Scanner scanner) {
26         System.out.println("Input the coefficient 'a': ");
27         int a = scanner.nextInt();
28         System.out.println("Input the constant term 'c': ");
29         int c = scanner.nextInt();
30         double x = (-c) / a;
31         System.out.println("The solution is: " + x);
32     }
33     private static void solveLinearSystem(Scanner scanner) {
34         System.out.println("Input the coefficient 'a1': ");
35         int a1 = scanner.nextInt();
36         System.out.println("Input the coefficient 'b1': ");
37         int b1 = scanner.nextInt();
38         System.out.println("Input the coefficient 'c1': ");
39         int c1 = scanner.nextInt();
40         System.out.println("Input the coefficient 'a2': ");
41         int a2 = scanner.nextInt();
42         System.out.println("Input the coefficient 'b2': ");
43         int b2 = scanner.nextInt();
44         System.out.println("Input the coefficient 'c2': ");
45         int c2 = scanner.nextInt();
46         double x = (c1 * a2 - c2 * a1) / (a1 * b2 - a2 * b1);
47         double y = (c1 - x * a1) / b1;
48         System.out.println("The solution is: " + x + ", " + y);
49     }
50 }

```

Figure 36: Run 2.2.6 (3.3)

This screenshot is nearly identical to Figure 36, showing the same Java code editor and IDE interface. The difference is in the JOptionPane dialog, which now asks for the coefficient 'c' instead of 'b'. The dialog title is "Nguyen Thi Nhung 20215109 - Input the coefficient 'c'" and the message is "Please input the coefficient 'c' for the quadratic equation: ax^2 + bx + c = 0". The input field contains the value 5.

Figure 37: Run 2.2.6 (3.4)

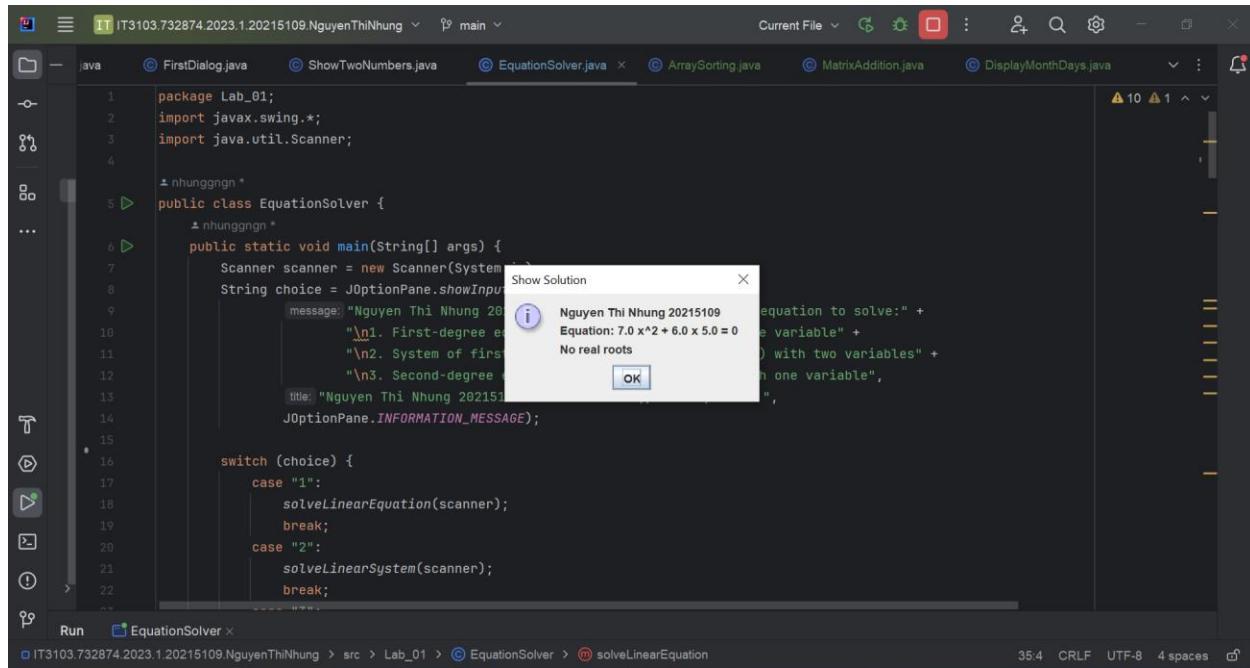


Figure 38: Run 2.2.6 (3.5)

Các bài từ 6.1 đến 6.6

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

Figure 39: Source code 6.1

Kết quả:

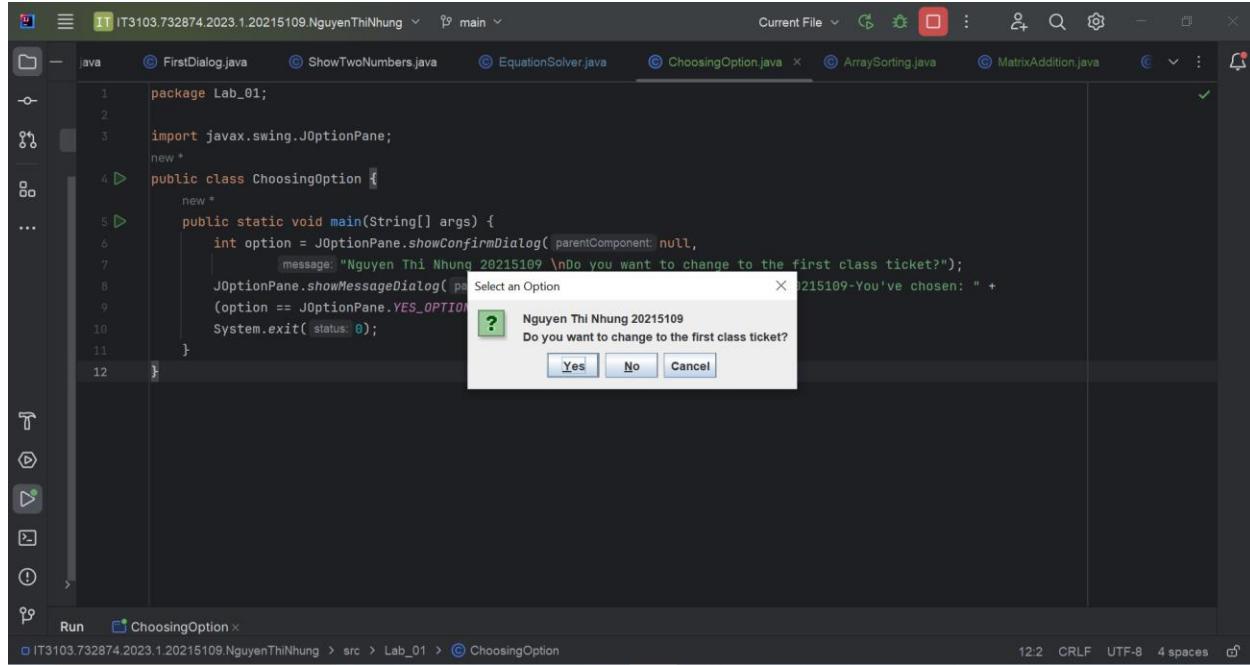


Figure 40: Run 6.1 (1)

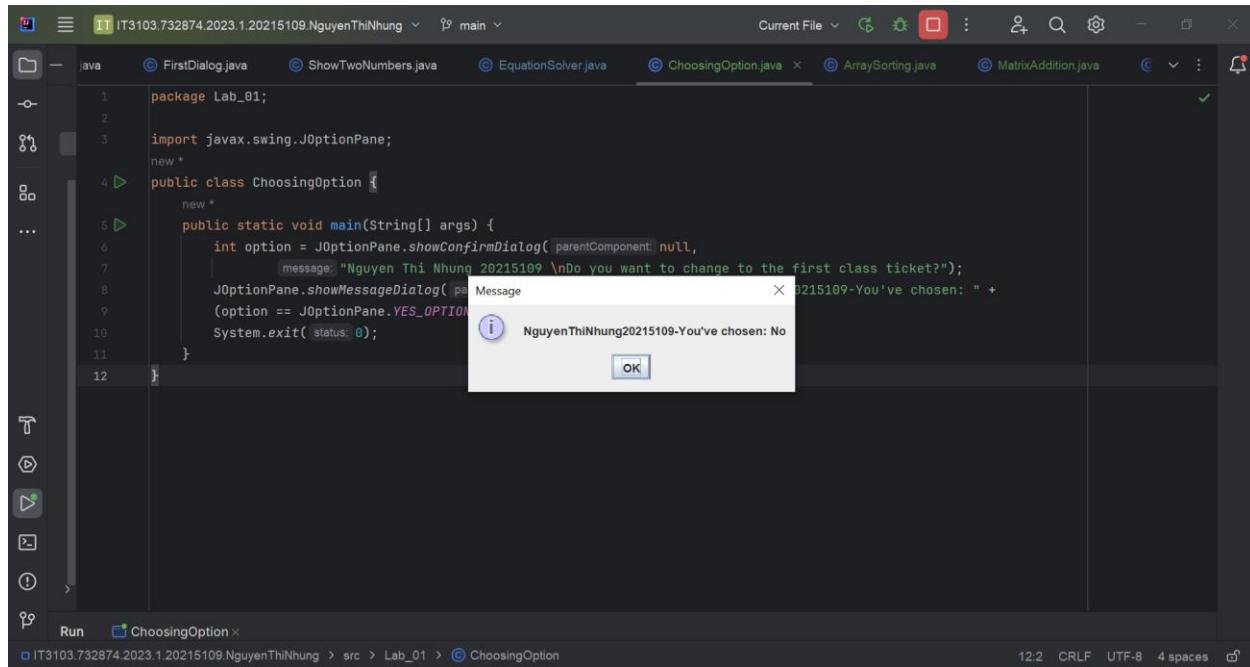


Figure 41: Run 6.1 (2)

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

Figure 42: Source code 6.2

Kết quả:

```

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

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:localhost=61111" Nguyen Thi Nhung 20215109 - What's your name?
Nhunggnn
Nguyễn Thị Nhụng 20215109 - How old are you?
20
Nguyễn Thị Nhụng 20215109 - How tall are you (m)?
1.9
Mrs/Ms. Nhunggnn, 20 years old. Your height is 1.9.

Process finished with exit code 0

```

Figure 43: Run 6.2

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

```

1 package Lab_01;
2 import java.util.Scanner;
3 nhunggnn*
4 public class TriangleDisplay {
5     nhunggnn*
6     public static void main(String[] args) {
7         Scanner scanner = new Scanner(System.in);
8         System.out.print("Please enter the height of the triangle: ");
9         int n = scanner.nextInt();
10
11         for (int i = 1; i <= n; i++) {
12             for (int j = 1; j <= n - i; j++) {
13                 System.out.print(" ");
14             } // tạo ra khoảng trắng ở đầu mỗi dòng
15             for (int j = 1; j < 2 * i; j++){
16                 System.out.print("*");
17             } // in ra 2i-1 ngôi sao
18             System.out.println();
19         }
20     }

```

Figure 44: Source code 6.3

Kết quả:

Figure 45: Run 6.3

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.

Mã nguồn:

```

1 package Lab_01;
2
3 import java.util.Scanner;
4
5 nhungngn *
6 D public class DisplayMonthDays {
7     nhungngn *
8     public static void main(String[] args) {
9         Scanner scanner = new Scanner(System.in);
10
11         int year = getValidYear(scanner); //gọi phương thức duyệt năm
12         int month = getValidMonth(scanner); //gọi phương thức duyệt tháng
13
14         int days = getNumberOfDays(month, year); //gọi phương thức duyệt số ngày
15         System.out.println("Number of days: " + days);
16     }
17
18     //Phương thức duyệt năm
19     usage nhungngn *
20     private static int getValidYear(Scanner scanner) {
21         int year;
22         do {
23             System.out.print("Please enter the year: ");
24             while (!scanner.hasNextInt()) {
25                 System.out.println("Invalid input. Please enter a valid year.");
26                 scanner.next();
27             } //nhập năm
28             year = scanner.nextInt();
29             if (year < 0) {
30                 System.out.println("Invalid input. Please enter a non-negative year.");
31             } // nếu năm nhập vào không hợp lệ thì nhập lại
32         } while (year < 0);
33         return year;
34     }

```

Figure 46: Source code 6.4 (1)

```
31     }
32
33     //Phương thức duyệt tháng
34     @
35     private static int getValidMonth(Scanner scanner) {
36         int month;
37         do {
38             System.out.print("Please enter the month: ");
39             String input = scanner.next();
40             switch (input.toLowerCase()) {
41                 case "january":
42                 case "jan.":
43                 case "jan":
44                 case "1":
45                     month = 1; //tháng 1
46                     break;
47                 case "february":
48                 case "feb.":
49                 case "feb":
50                     month = 2; //tháng 2
51                     break;
52                 case "march":
53                 case "mar.":
54                 case "mar":
55                 case "3":
56                     month = 3; //tháng 3
57                     break;
58                 case "april":
59                 case "apr.":
60                 case "apr":
61                 case "4":
62                     month = 4; //tháng 4
63             }
64         }
65     }
```

Figure 47: Source code 6.4 (2)

```
63 |         break;
64 |     case "may":
65 |     case "5":
66 |         month = 5; //tháng 5
67 |         break;
68 |     case "june":
69 |     case "jun.":
70 |     case "jun":
71 |     case "6":
72 |         month = 6; //tháng 6
73 |         break;
74 |     case "july":
75 |     case "jul.":
76 |     case "jul":
77 |     case "7":
78 |         month = 7; //tháng 7
79 |         break;
80 |     case "august":
81 |     case "aug.":
82 |     case "aug":
83 |     case "8":
84 |         month = 8; //tháng 8
85 |         break;
86 |     case "september":
87 |     case "sep.":
88 |     case "sep":
89 |     case "9":
90 |         month = 9; //tháng 9
91 |         break;
92 |     case "october":
93 |     case "oct.":
94 |     case "oct":
```

Figure 48: Source code 6.4 (3)

```
95     case "10":
96         month = 10; //tháng 10
97         break;
98     case "november":
99     case "nov.":
100    case "nov":
101    case "11":
102        month = 11; //tháng 11
103        break;
104    case "december":
105    case "dec.":
106    case "dec":
107    case "12":
108        month = 12; //tháng 12
109        break;
110    default:
111        month = 0;
112        System.out.println("Invalid input. Please enter a valid month.");
113    }
114 } while (month == 0);
115 return month;
116 }
117
118 //Phương thức duyệt số ngày
119 //usage ~ nhungnngn*
120 private static int getNumberOfDays(int month, int year) {
121     int days;
122     switch (month) {
123         case 1:
124         case 3:
125         case 5:
126         case 7:
127         case 8:
```

Figure 49: Source code 6.4 (4)

```

126
127     case 8:
128     case 10:
129     case 12:
130         days = 31;
131         break;
132     case 4:
133     case 6:
134     case 9:
135     case 11:
136         days = 30;
137         break;
138     case 2: // nếu năm nhuận thì có 29 ngày, không nhuận thì có 28 ngày
139         days = isLeapYear(year) ? 29 : 28;
140         break;
141     default:
142         days = 0;
143     }
144     return days;
145 }
146
147 //Phương thức tính năm nhuận
148 private static boolean isLeapYear(int year) {
149     return (year % 4 == 0 && year % 100 != 0) || (year % 400 == 0);
150 }
151

```

Figure 50: Source code 6.4 (5)

Kết quả:

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

- Project Structure:** Shows files like ChoosingOption.java, InputFromKeyboard.java, TriangleDisplay.java, ArraySorting.java, MatrixAddition.java, and DisplayMonthDays.java.
- Run Tab:** Shows the configuration for "DisplayMonthDays".
- Output Window:** Displays the run log:


```
"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,C:\Program Files\JetBrains\IntelliJ IDEA Community Edition 2023.2.3\lib\javafxrt.jar=5202" -Dfile.encoding=UTF-8 main
Please enter the year: 2008
Please enter the month: 2
Number of days: 29
Process finished with exit code 0
```
- Status Bar:** Shows the file path as IT3103.732874.2023.1.20215109.NguyenThiNhun, encoding as CRLF, and character count as 46:28.

Figure 51: Run 6.4

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

Mã nguồn:

```

1  package Lab_01;
2  import java.util.Scanner;
3  import java.util.Arrays;
4
5  nhungngn *
6  public class ArraySorting {
7      nhungngn *
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(); //Nhập số phần tử của mảng
12         int[] array = new int[n]; //khai báo mảng số nguyên với số phần tử do người dùng nhập
13         for (int i = 0; i < n; i++) {
14             int b = i + 1;
15             System.out.println("Please enter the number " + b + ": ");
16             array[i] = keyboard.nextInt(); // nhập các phần tử của mảng
17         }
18         // sắp xếp mảng theo thứ tự tăng dần
19         Arrays.sort(array);
20         // In mảng đã sắp xếp
21         System.out.println("Sorted array: " + Arrays.toString(array));
22
23         // tính tổng các phần tử
24         int sum = 0;
25         for (int num : array) {
26             sum += num;
27         }
28         System.out.println("Sum: " + sum);
29
30         // tính trung bình giá trị các phần tử
31         double average = (double) sum / array.length;
32         System.out.println("Average: " + average);
33     }

```

Figure 52: Source code 6.5

```
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
```

Figure 53: Run 6.5

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

Mã nguồn:

```
1 package Lab_01;
2
3 import java.util.Scanner;
4
5 /**
6 * nhungngn *
7 * public class MatrixAddition {
8 *     /**
9 *      * Nhập kích thước của ma trận
10 *      System.out.print("Enter the number of rows: ");
11 *      int rows = scanner.nextInt();
12 *      System.out.print("Enter the number of columns: ");
13 *      int columns = scanner.nextInt();
14 *
15 *      // Tạo ma trận thứ nhất
16 *      int[][] matrix1 = createMatrix(scanner, rows, columns, "Matrix 1");
17 *
18 *      // Tạo ma trận thứ hai
19 *      int[][] matrix2 = createMatrix(scanner, rows, columns, "Matrix 2");
20 *
21 *      // Tính tổng hai ma trận
22 *      int[][] sumMatrix = addMatrices(matrix1, matrix2);
23 *
24 *      // In ra ma trận tổng
25 * }
```

Figure 54: Source code 6.6 (1)

```

24         // In ra ma trận tổng
25         System.out.println("Sum of matrices:");
26         printMatrix(sumMatrix);
27     }
28     // Phương thức nhập giá trị cho các phần tử của ma trận
29     @ 2 usages  ↳ nhungnngn
30     private static int[][] createMatrix(Scanner scanner, int rows, int columns, String matrixName) {
31         System.out.println("Enter the elements of " + matrixName + ":");
32         int[][] matrix = new int[rows][columns];
33         for (int i = 0; i < rows; i++) {
34             for (int j = 0; j < columns; j++) {
35                 System.out.print(matrixName + "[" + (i + 1) + "][" + (j + 1) + "]: ");
36                 matrix[i][j] = scanner.nextInt();
37             }
38         }
39         return matrix;
40     }
41     // Phương thức cộng ma trận
42     @ 1 usage  ↳ nhungnngn
43     private static int[][] addMatrices(int[][] matrix1, int[][] matrix2) {
44         int rows = matrix1.length;
45         int columns = matrix1[0].length;
46
47         int[][] sumMatrix = new int[rows][columns];
48         for (int i = 0; i < rows; i++) {
49             for (int j = 0; j < columns; j++) {
50
51                 for (int k = 0; k < columns; k++) {
52                     sumMatrix[i][j] = matrix1[i][k] + matrix2[i][k];
53                 }
54             }
55         }
56         return sumMatrix;
57     }
58     // Phương thức in ma trận
59     @ 1 usage  ↳ nhungnngn
60     private static void printMatrix(int[][] matrix) {
61         int rows = matrix.length;
62         int columns = matrix[0].length;
63
64         for (int i = 0; i < rows; i++) {
65             for (int j = 0; j < columns; j++) {
66                 System.out.print(matrix[i][j] + " ");
67             }
68             System.out.println();
69         }
70     }

```

Figure 55: Source code 6.6 (2)

```

47         for (int j = 0; j < columns; j++) {
48             sumMatrix[i][j] = matrix1[i][j] + matrix2[i][j];
49         }
50     }
51     return sumMatrix;
52 }
53 // Phương thức in ma trận
54 @ 1 usage  ↳ nhungnngn
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     }
66

```

Figure 56: Source code 6.6 (3)

Kết quả:

```
IT3103.732874.2023.1.20215109.NguyenThiNhung main
Run MatrixAddition
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
```

Figure 57: Run 6.6