ĐẠI HỌC BÁCH KHOA HÀ NỘI
TRƯỜNG CÔNG NGHỆ THÔNG TIN VÀ TRUYỀN THÔNG

BÁO CÁO THỰC HÀNH
IT3103 – 744528 - 2024.1

BÀI THỰC HÀNH 1

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Hà Nội 9/2024

Mục lục nội dung

DANH MỤC HÌNH ẢNH

BÁO CÁO THỰC HÀNH LAP 1

The Very First Java Programs

2.2.1 Write, compile the first Java application:

Code:

```java
//EXample 1: HelloWorld.java

public class HelloWorld {
    public static void main(String[] args) {
        System.out.println("CuongPQ - 20225604");
        System.out.println("Xin chao \n cac ban!");
        System.out.println("Hello \t world!");
    }
}
```

Execute:

```
PROBLEMS  OUTPUT  DEBUG CONSOLE  TERMINAL  PORTS  GITLENS  Code

PS C:\Users\Admin\OneDrive - Hanoi University of Science and Technology\Documents\Code\OOP Lab
\IT3103.744528.2024.1.20225604.PhamQuocCuong\lab01> javac HelloWorld.java
PS C:\Users\Admin\OneDrive - Hanoi University of Science and Technology\Documents\Code\OOP Lab
\IT3103.744528.2024.1.20225604.PhamQuocCuong\lab01> java HelloWorld
CuongPQ - 20225604
Xin chao
 cac ban!
Hello    world!
PS C:\Users\Admin\OneDrive - Hanoi University of Science and Technology\Documents\Code\OOP Lab
\IT3103.744528.2024.1.20225604.PhamQuocCuong\lab01>
```

Figure 1: Result 2.2.1

2.2.2 Write, compile the first dialog Java program.

Code:

```java
//Example 2:
import javax.swing.JOptionPane;

public class FirstDialog {
    public static void main(String[] args) {
        JOptionPane.showMessageDialog(null, "Pham Quoc Cuong - 5604 - Hello! How are you?");
        System.exit(0);
    }
}
```

Figure 2: Code 2.2.2

Execute:

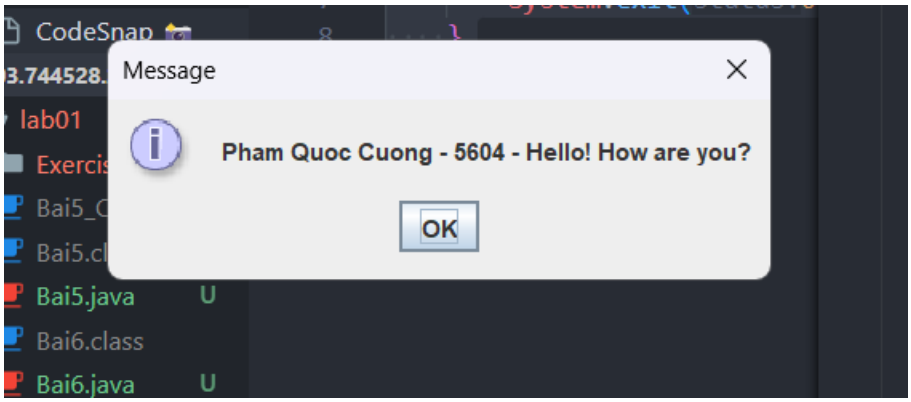


Figure 3: Result example 2.2.2

2.2.3 Write, compile the first input dialog Java application.

Code:

```java
//Example 3:
import javax.swing.JOptionPane;

public class HelloNameDialog {
    public static void main(String[] args) {
        String result;
        result = JOptionPane.showInputDialog("CuongPQ - 5604 - Please enter your name:");
        JOptionPane.showMessageDialog(null, "I'm Pham Quoc Cuong - 5604 - Hi "+ result + "!");
        System.exit(0);
    }
}
```

Figure 4: Code example 2.2.3

Execute:

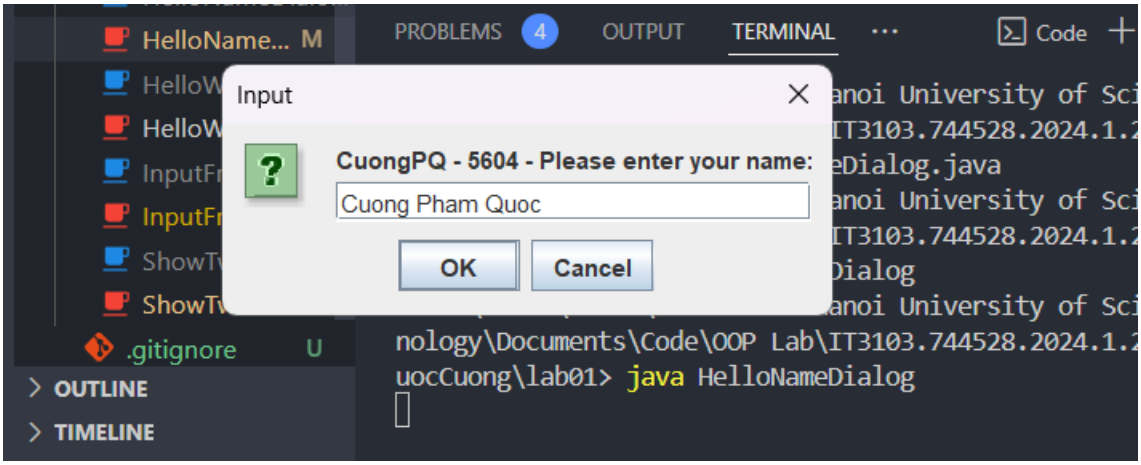


Figure 5: Run example 2.2.3

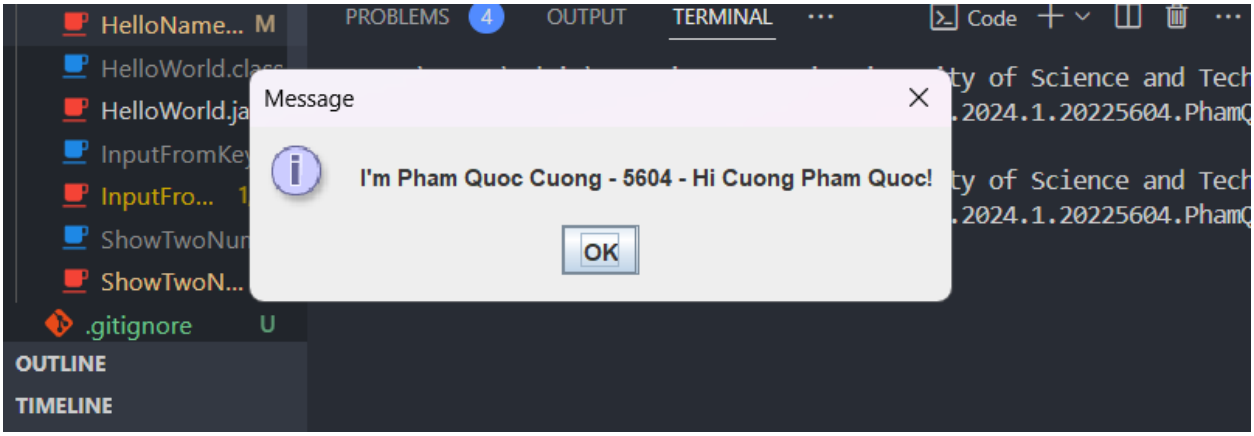
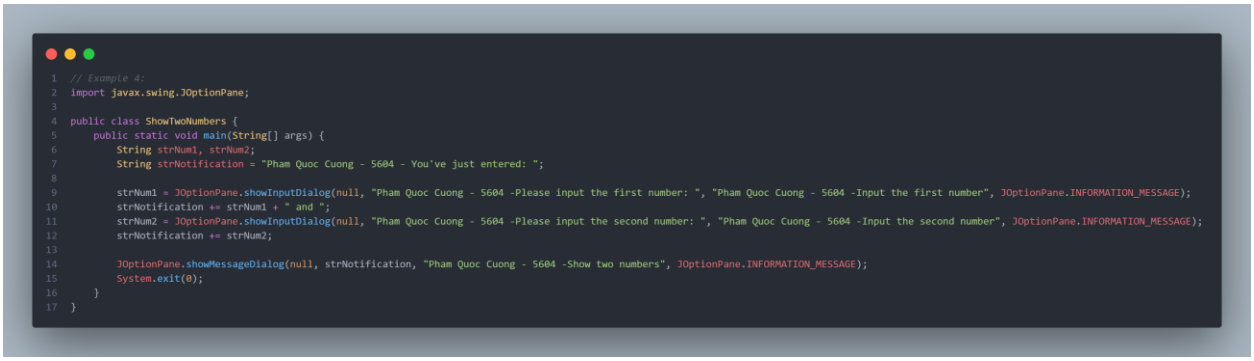


Figure 6: Result example 2.2.3

2.2.4 Write, compile, and run the following example:

Code:



```
// Example 4:
import javax.swing.JOptionPane;

public class ShowTwoNumbers {
    public static void main(String[] args) {
        String strNum1, strNum2;
        String strNotification = "Pham Quoc Cuong - 5604 - You've just entered: ";

        strNum1 = JOptionPane.showInputDialog(null, "Pham Quoc Cuong - 5604 -Please input the first number: ", "Pham Quoc Cuong - 5604 -Input the first number", JOptionPane.INFORMATION_MESSAGE);
        strNotification += strNum1 + " and ";
        strNum2 = JOptionPane.showInputDialog(null, "Pham Quoc Cuong - 5604 -Please input the second number: ", "Pham Quoc Cuong - 5604 -Input the second number", JOptionPane.INFORMATION_MESSAGE);
        strNotification += strNum2;

        JOptionPane.showMessageDialog(null, strNotification, "Pham Quoc Cuong - 5604 -Show two numbers", JOptionPane.INFORMATION_MESSAGE);
        System.exit(0);
    }
}
```

Figure 7: Code example 2.2.4

Execute:

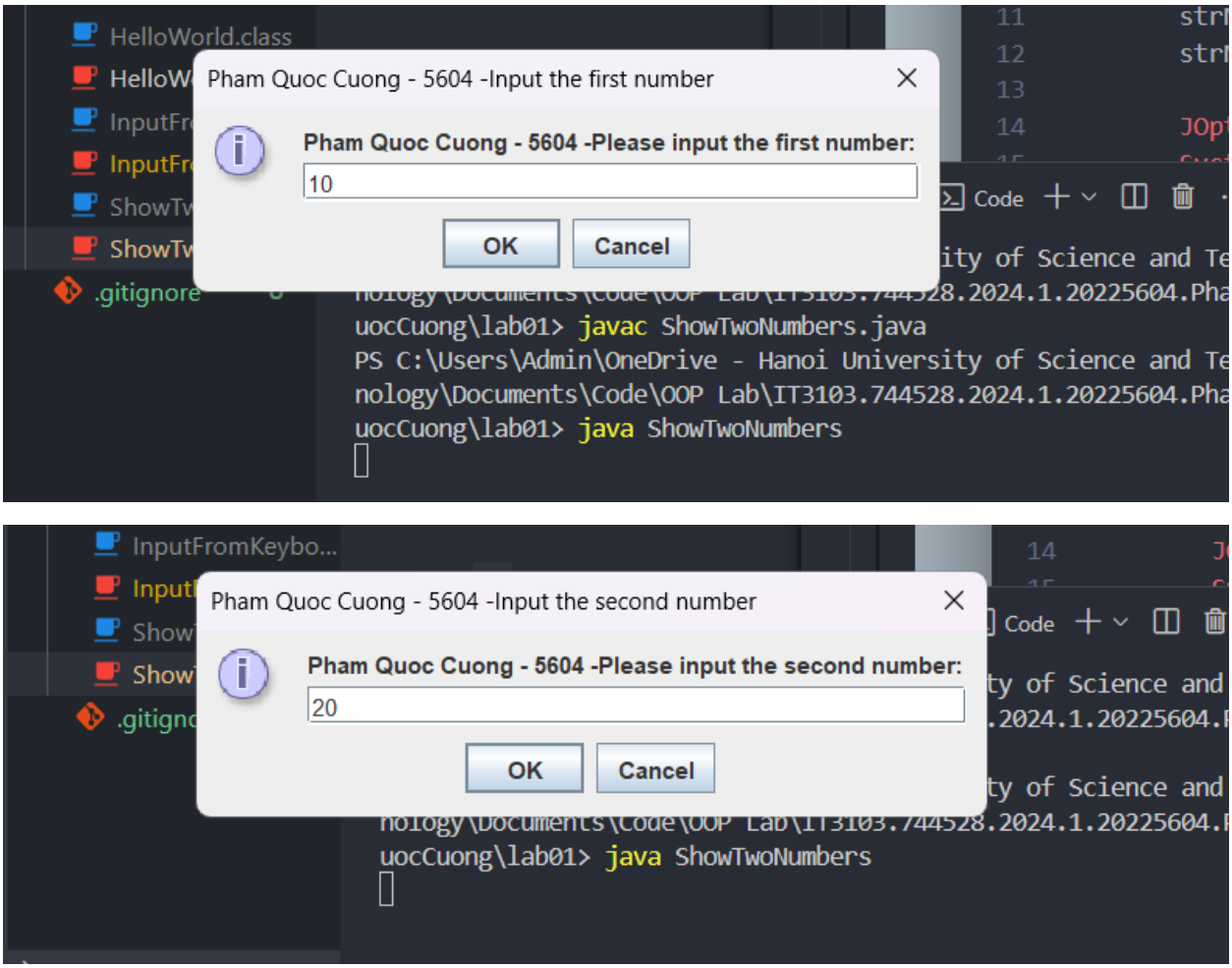


Figure 8: Run example 2.2.4

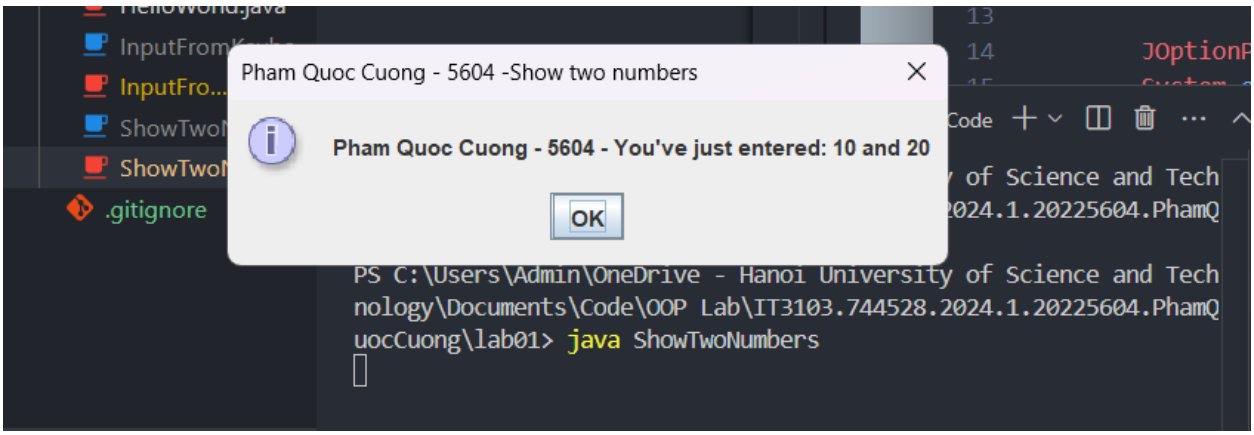


Figure 9: Result example 2.2.4

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

Code:

```java
// package Lab01;

import javax.swing.JOptionPane;

public class Bai5 {
    public static void main(String[] args) {
        String strNum1 = JOptionPane.showInputDialog("Pham Quoc Cuong - 5604 - Enter the first number:");
        String strNum2 = JOptionPane.showInputDialog("Pham Quoc Cuong - 5604 - Enter the second number:");

        double num1 = Double.parseDouble(strNum1);
        double num2 = Double.parseDouble(strNum2);

        double sum = num1 + num2;
        double difference = num1 - num2;
        double product = num1 * num2;

        String result = "First Number: " + num1 + "\n" +
                        "Second Number: " + num2 + "\n\n" +
                        "Sum: " + sum + "\n" +
                        "Difference: " + difference + "\n" +
                        "Product: " + product + "\n";

        if (num2 != 0) {
            double quotient = num1 / num2;
            result += "Quotient: " + quotient + "\n";
        } else {
            result += "Division by zero is not allowed.\n";
        }

        JOptionPane.showMessageDialog(null, result, "Results", JOptionPane.INFORMATION_MESSAGE);
    }
}
```

Figure 10: Code example 2.2.5

Execute:

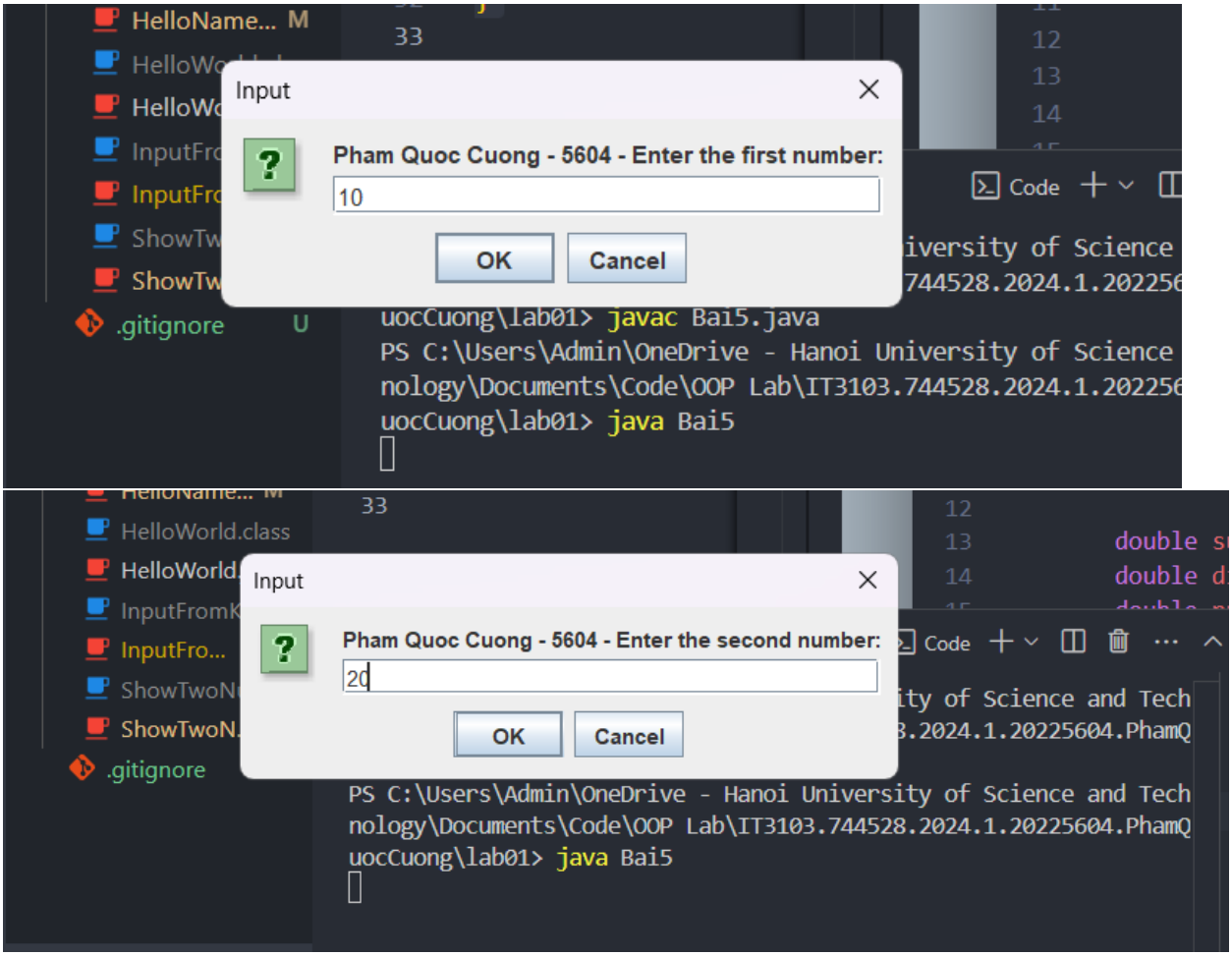


Figure 11: Run example 2.2.5

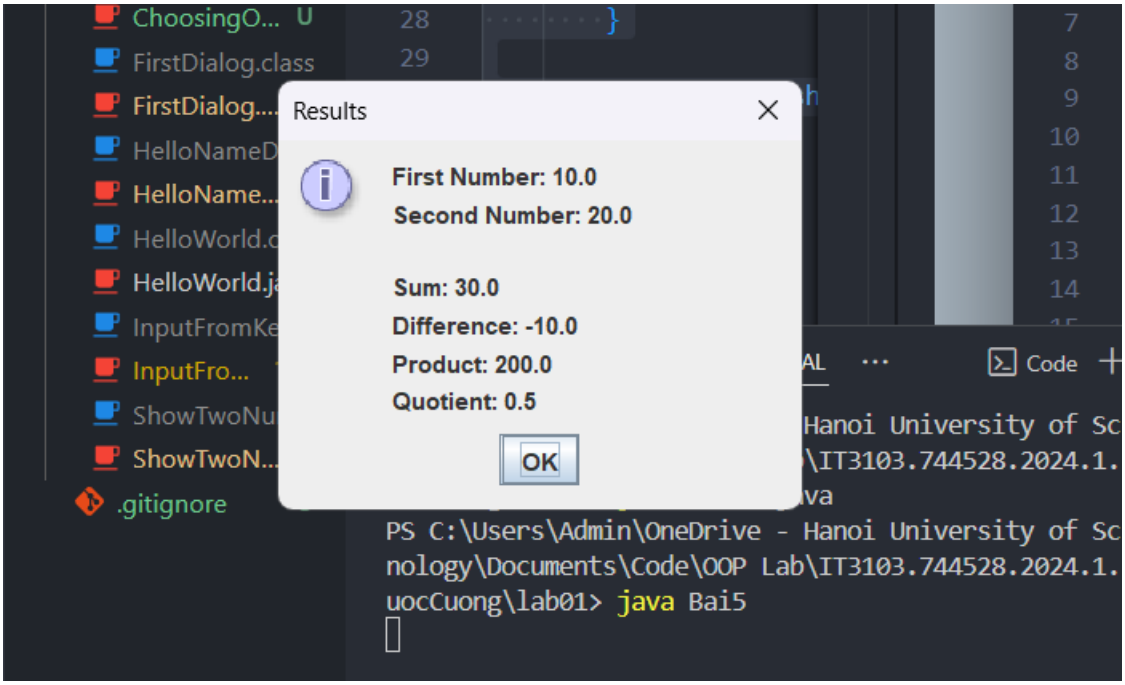


Figure 12: Result example 2.2.5

2.2.6 Write a program to solve equations.

Code:

```java
import java.util.Scanner;

public class Bai6 {
    // Select the type of equation to solve:
    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);

        System.out.println("Pham Quoc Cuong - 5604 - Select the type of equation to solve:");
        System.out.println("1. First-degree equation");
        System.out.println("2. System of first-degree equations with two variables");
        System.out.println("3. Second-degree equation ");
        int choice = sc.nextInt();

        switch (choice) {
            case 1:
                giaiPTBac1(sc);
                break;
            case 2:
                giaiHPTBac1(sc);
                break;
            case 3:
                giaiPTBac2(sc);
                break;
            default:
                System.out.println("Invalid choice");
        }
    }
```

```java
    public static void giaiPTBac1(Scanner sc) {
        System.out.println("Solving first-degree equation: ");
        System.out.print("Enter a (a != 0): ");
        double a = sc.nextDouble();
        System.out.print("Enter b: ");
        double b = sc.nextDouble();

        if (a == 0) {
            System.out.println("Invalid input. a != 0.");
        } else {
            double x = -b / a;
            System.out.println("Solution: x = " + x);
        }
    }

    public static void giaiHPTBac1(Scanner sc) {
        System.out.println("Solving system of two first-degree equations:");
        System.out.print("Enter a11: ");
        double a11 = sc.nextDouble();
        System.out.print("Enter a12: ");
        double a12 = sc.nextDouble();
        System.out.print("Enter b1: ");
        double b1 = sc.nextDouble();
        System.out.print("Enter a21: ");
        double a21 = sc.nextDouble();
        System.out.print("Enter a22: ");
        double a22 = sc.nextDouble();
        System.out.print("Enter b2: ");
        double b2 = sc.nextDouble();

        // Calculate determinants
        double D = a11 * a22 - a21 * a12;
        double D1 = b1 * a22 - b2 * a12;
        double D2 = a11 * b2 - a21 * b1;

        if (D == 0) {
            if (D1 == 0 && D2 == 0) {
                System.out.println("The system has infinitely many solutions.");
            } else {
                System.out.println("The system has no solution.");
            }
        } else {
            double x1 = D1 / D;
            double x2 = D2 / D;
            System.out.println("Solution: x1 = " + x1 + ", x2 = " + x2);
        }
    }
```

```java
    public static void giaiPTBac2(Scanner sc) {
        System.out.println("Solving second-degree equation: ");
        System.out.print("Enter a (a != 0): ");
        double a = sc.nextDouble();
        System.out.print("Enter b: ");
        double b = sc.nextDouble();
        System.out.print("Enter c: ");
        double c = sc.nextDouble();

        if (a == 0) {
            System.out.println("Invalid input. a != 0.");
        } else {
            double delta = b * b - 4 * a * c;

            if (delta > 0) {
                double x1 = (-b + Math.sqrt(delta)) / (2 * a);
                double x2 = (-b - Math.sqrt(delta)) / (2 * a);
                System.out.println("The equation has two distinct real roots: x1 = " + x1 + ", x2 = " + x2);
            } else if (delta == 0) {
                double x = -b / (2 * a);
                System.out.println("The equation has a double root: x = " + x);
            } else {
                System.out.println("The equation has no real roots.");
            }
        }
    }
}
```

Figure 13: Code example 2.2.6

Execute:

```
PROBLEMS  OUTPUT  DEBUG CONSOLE  TERMINAL  PORTS  GITLENS        Run: Bai6

dt_ws\IT3103.744528.2024.1.20225604.PhamQuocCuong_71749fb\bin' 'Bai6'
Select the type of equation to solve:
1. First-degree equation
2. System of first-degree equations with two variables
3. Second-degree equation
1
Solving first-degree equation:
Enter a (a != 0): 5
Enter b: 10
Solution: x = -2.0
PS C:\Users\Admin\OneDrive - Hanoi University of Science and Technology\Documents\Cod
e\OOP Lab\IT3103.744528.2024.1.20225604.PhamQuocCuong>
```

Figure 14: Result example 2.2.6 (first-degree equation)

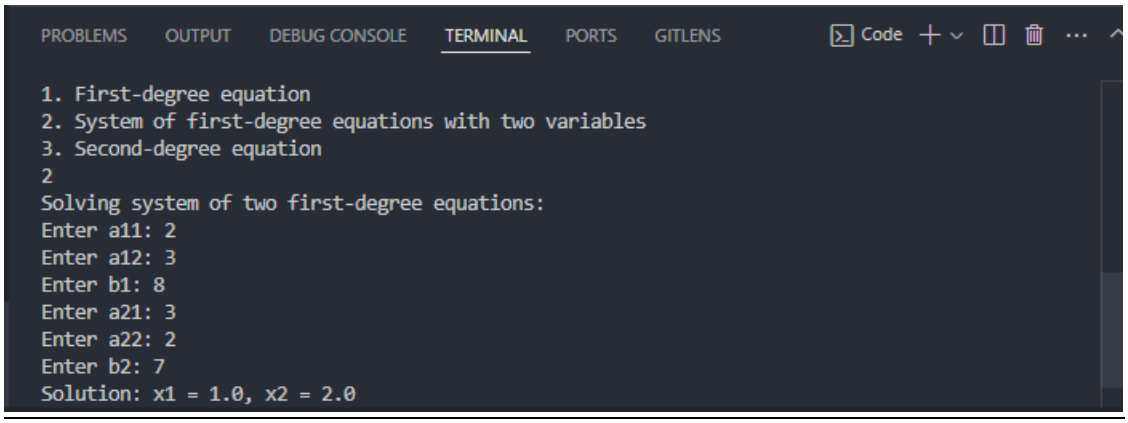


Figure 15: Result example 2.2.6 (system of first-degree equation)

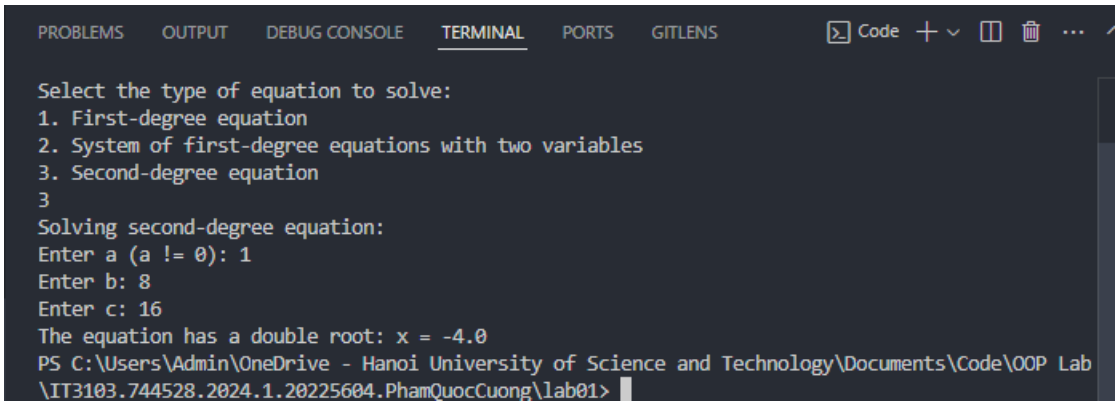


Figure 16: Result example 2.2.6 (second-degree equation)

Exercises

6.1 Write, compile and run the ChoosingOption program.

Code:

```java
import javax.swing.JOptionPane;

public class ChoosingOption {
    public static void main(String[] args){
        int option = JOptionPane.showConfirmDialog(null, "Pham Quoc Cuong - 5604 - Do you want to change to the first class ticket?");
        JOptionPane.showMessageDialog(null, "Pham Quoc Cuong - 5604 - You've chosen: "
        + (option==JOptionPane.YES_OPTION?"Yes":"No"));
        System.exit(0);
    }
}
```

Figure 17: Code exercise 6.1

Execute:

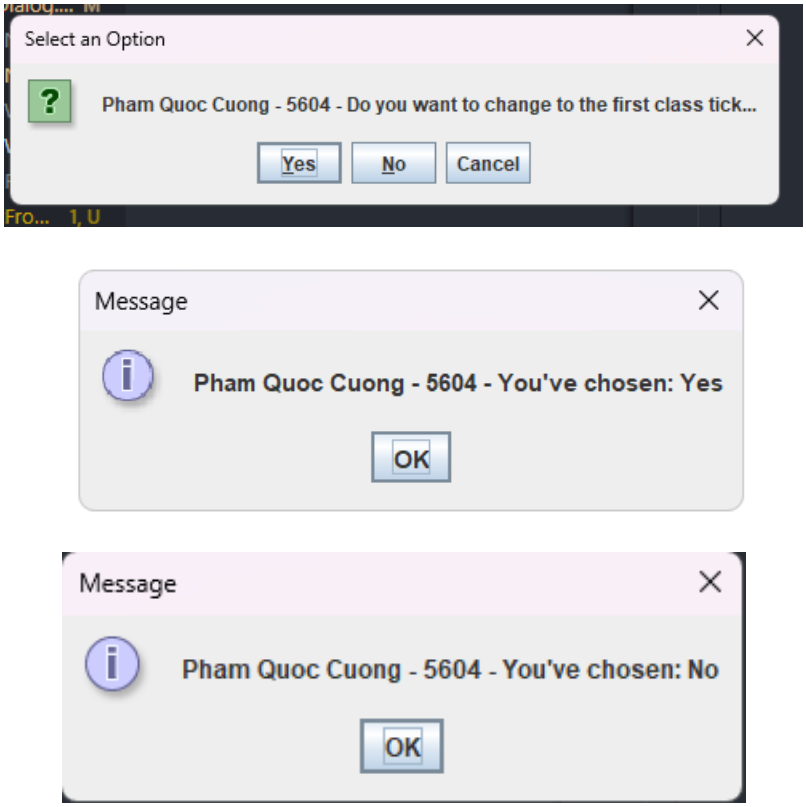
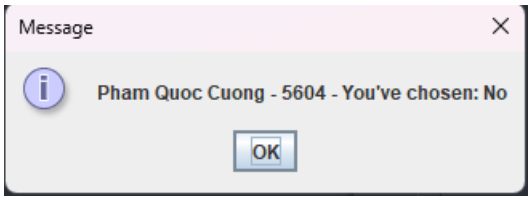


Figure 18: Result exercise 6.1

Answer the question:

- Nếu người dùng chọn “Cancel”, example sẽ coi như người dùng đã chọn “No” và hiển thị Result như sau:



- Để tùy chỉnh các tùy chọn, sử dụng code như sau:

```java
import javax.swing.JOptionPane;

public class ChoosingOptionCustom {
    public static void main(String[] args){
        String[] options = {"I do", "I don't"};

        int option = JOptionPane.showOptionDialog(
                null,
                "Pham Quoc Cuong - 5604 - Do you want to change to the first class ticket?",
                "Choose an option",
                JOptionPane.YES_NO_OPTION,
                JOptionPane.QUESTION_MESSAGE,
                null,
                options,
                options[0]);

        JOptionPane.showMessageDialog(
                null,
                "Pham Quoc Cuong - 5604 - You've chosen: " +
                (option == 0 ? "I do" : "I don't"));

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

Figure 19: Custom code exercise 6.1

- Khi đó dialog chỉ hiển thị 2 tùy chọn:

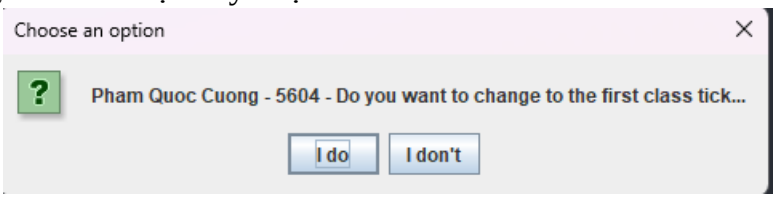


Figure 20: Result exercise 6.1 after customed

6.2 Write a program for input/output from keyboard.

Code:

```java
import java.util.Scanner;

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

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

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

Figure 21: Code exercise 6.2

Execute:

```
PS C:\Users\Admin\OneDrive - Hanoi University of Science and Technology\Documents\Code\OOP Lab
\IT3103.744528.2024.1.20225604.PhamQuocCuong\lab01>java Exercise.JavaBasics.src.InputFromKeybo
ard
What's your name?
Pham Quoc Cuong
How old are you?
20
How tall are you (m)?
1.71
Mrs/Ms. Pham Quoc Cuong, 20 years old. Your height is 1.71.
```

Figure 22: Result exercise 6.2

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

Code:

```java
import java.util.Scanner;

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

        System.out.print("Input the height of the triangle: ");
        int n = sc.nextInt();

        for(int i=1; i<=n; i++){
            // In khoang trang
            for(int j=1; j<=n-i; j++){
                System.out.print(" ");
            }
            // In dau *
            for(int k=1; k <= 2*i-1; k++){
                System.out.print("*");
            }
            System.out.println();
        }

    }
}
```

Figure 23: Code exercise 6.3

Execute:

```
PROBLEMS 5  OUTPUT  DEBUG CONSOLE  TERMINAL  PORTS  GITLENS  Run: Triangle
Input the height of the triangle: 5
    *
   ***
  *****
 *******
*********
PS C:\Users\Admin\OneDrive - Hanoi University of Science and Technology\Documents\Code\OOP Lab
\IT3103.744528.2024.1.20225604.PhamQuocCuong>
```

Figure 24: Result exercise 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).

Code:

```java
import java.util.Scanner;

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

        while (true) {
            System.out.print("Enter a month : ");
            monthInput = scanner.nextLine().trim();

            System.out.print("Enter a year : ");
            if (scanner.hasNextInt()) {
                year = scanner.nextInt();
                scanner.nextLine();
                if (year >= 0) {
                    break;
                } else {
                    System.out.println("Invalid year! Please enter a non-negative integer.");
                }
            } else {
                System.out.println("Invalid input! Please enter a valid integer year.");
                scanner.next();
            }
        }

        int days = getDaysInMonth(monthInput, year);
        if (days == -1) {
            System.out.println("Invalid month input.");
        } else {
            System.out.println("Number of days: " + days);
        }

        scanner.close();
    }

    public static int getDaysInMonth(String monthInput, int year) {
        int month = parseMonth(monthInput);
        if (month == -1) {
            return -1;
        }

        switch (month) {
            case 1: case 3: case 5: case 7: case 8: case 10: case 12:
                return 31;
            case 4: case 6: case 9: case 11:
                return 30;
            case 2:
                if (isLeapYear(year)) {
                    return 29;
                } else {
                    return 28;
                }
            default:
                return -1;
        }
    }
```

```
59
60      public static int parseMonth(String monthInput) {
61          switch (monthInput.toLowerCase()) {
62              case "january": case "jan.": case "jan": case "1":
63                  return 1;
64              case "february": case "feb.": case "feb": case "2":
65                  return 2;
66              case "march": case "mar.": case "mar": case "3":
67                  return 3;
68              case "april": case "apr.": case "apr": case "4":
69                  return 4;
70              case "may": case "5":
71                  return 5;
72              case "june": case "jun.": case "jun": case "6":
73                  return 6;
74              case "july": case "jul.": case "jul": case "7":
75                  return 7;
76              case "august": case "aug.": case "aug": case "8":
77                  return 8;
78              case "september": case "sep.": case "sep": case "9":
79                  return 9;
80              case "october": case "oct.": case "oct": case "10":
81                  return 10;
82              case "november": case "nov.": case "nov": case "11":
83                  return 11;
84              case "december": case "dec.": case "dec": case "12":
85                  return 12;
86              default:
87                  return -1;
88          }
89      }
90
91      public static boolean isLeapYear(int year) {
92          if (year % 4 == 0) {
93              if (year % 100 == 0) {
94                  return year % 400 == 0;
95              } else {
96                  return true;
97              }
98          }
99          return false;
100     }
101 }
102
```

Figure 25: Code exercise 6.4

Execute:

```
PS C:\Users\Admin\OneDrive - Hanoi University of Science and Technology\Documents\Code\OOP Lab
\IT3103.744528.2024.1.20225604.PhamQuocCuong\lab01> java Exercise.DaysOfMonth.src.DaysOfMonth
Enter a month : Feb
Enter a year : 100
Number of days: 28
PS C:\Users\Admin\OneDrive - Hanoi University of Science and Technology\Documents\Code\OOP Lab
\IT3103.744528.2024.1.20225604.PhamQuocCuong\lab01>
```

```
\IT3103.744528.2024.1.20225604.PhamQuocCuong\lab01> java Exercise.DaysOfMonth.src.DaysOfMonth
Enter a month : 5
Enter a year : 2024
Number of days: 31
PS C:\Users\Admin\OneDrive - Hanoi University of Science and Technology\Documents\Code\OOP Lab
\IT3103.744528.2024.1.20225604.PhamQuocCuong\lab01>
```

```
Enter a month : 2
Enter a year : 2024
Number of days: 29
PS C:\Users\Admin\OneDrive - Hanoi University of Science and Technology\Documents\Code\OOP Lab
\IT3103.744528.2024.1.20225604.PhamQuocCuong\lab01>
```

```
PROBLEMS 4  OUTPUT  DEBUG CONSOLE  TERMINAL  PORTS  GITLENS  powershell
Enter a month : 12
Enter a year : -1
Invalid year! Please enter a non-negative integer.
Enter a month : 13
Enter a year : 2025
Invalid month input.
PS C:\Users\Admin\OneDrive - Hanoi University of Science and Technology\Documents\Code\OOP Lab
\IT3103.744528.2024.1.20225604.PhamQuocCuong\lab01>
```

Figure 26: Result exercise 6.4

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

Code:

```java
import java.util.Arrays;
import java.util.Scanner;

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

        System.out.print("Pham Quoc Cuong - 5604 - Do you want to enter your own array? (yes/no): ");
        String userChoice = scanner.nextLine().trim().toLowerCase();

        double[] numbers;

        if (userChoice.equals("yes")) {
            System.out.print("Enter the number of elements in the array: ");
            int n = scanner.nextInt();

            numbers = new double[n];

            System.out.println("Enter " + n + " elements of the array:");
            for (int i = 0; i < n; i++) {
                numbers[i] = scanner.nextDouble();
            }
        } else {
            numbers = new double[]{10.5, 5.2, 8.3, 3.1, 2.8};
            System.out.println("Using the constant array: " + Arrays.toString(numbers));
        }

        Arrays.sort(numbers);

        double sum = 0;
        for (double num : numbers) {
            sum += num;
        }

        double average = sum / numbers.length;

        System.out.println("Sorted array: " + Arrays.toString(numbers));
        System.out.println("Sum of array elements: " + sum);
        System.out.println("Average of array elements: " + average);

        scanner.close();
    }
}
```

Figure 27: Code exercise 6.5

Execute:

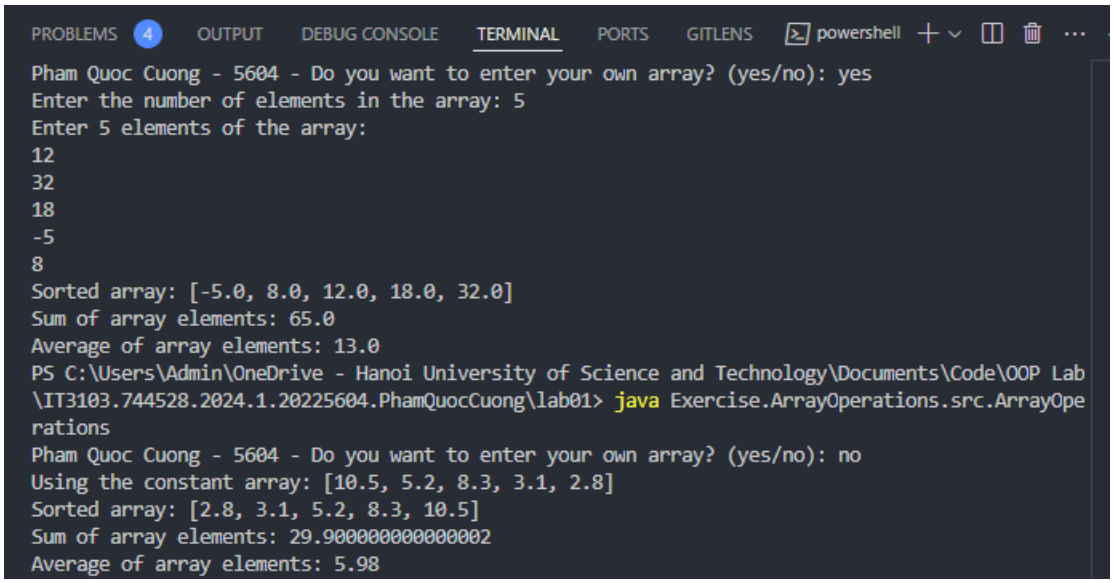


Figure 28: Result exercise 6.5

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

Code:

```java
import java.util.Scanner;

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

        System.out.print("Pham Quoc Cuong - 5604 - Do you want to enter your own matrices? (yes/no): ");
        String userChoice = scanner.nextLine().trim().toLowerCase();

        int rows, cols;
        double[][] matrix1, matrix2, resultMatrix;

        if (userChoice.equals("yes")) {
            System.out.print("Enter the number of rows for the matrices: ");
            rows = scanner.nextInt();
            System.out.print("Enter the number of columns for the matrices: ");
            cols = scanner.nextInt();

            matrix1 = new double[rows][cols];
            matrix2 = new double[rows][cols];
            resultMatrix = new double[rows][cols];

            System.out.println("Enter elements for the first matrix:");
            for (int i = 0; i < rows; i++) {
                for (int j = 0; j < cols; j++) {
                    System.out.print("Element [" + i + "][" + j + "]: ");
                    matrix1[i][j] = scanner.nextDouble();
                }
            }

            System.out.println("Enter elements for the second matrix:");
            for (int i = 0; i < rows; i++) {
                for (int j = 0; j < cols; j++) {
                    System.out.print("Element [" + i + "][" + j + "]: ");
                    matrix2[i][j] = scanner.nextDouble();
                }
            }

        } else {
            matrix1 = new double[][]{
                {1.5, 2.3, 3.7},
                {4.1, 5.8, 6.0},
                {7.9, 8.2, 9.5}
            };

            matrix2 = new double[][]{
                {9.1, 8.4, 7.2},
                {6.3, 5.7, 4.4},
                {3.6, 2.5, 1.8}
            };

            rows = matrix1.length;
            cols = matrix1[0].length;
            resultMatrix = new double[rows][cols];

            System.out.println("Using predefined matrices.");
        }
        System.out.println("Matrix 1:");
        displayMatrix(matrix1);
        System.out.println("Matrix 2:");
        displayMatrix(matrix2);

        for (int i = 0; i < rows; i++) {
            for (int j = 0; j < cols; j++) {
                resultMatrix[i][j] = matrix1[i][j] + matrix2[i][j];
            }
        }

        System.out.println("Resulting matrix after addition:");
        displayMatrix(resultMatrix);

        scanner.close();
    }
```

```java
    public static void displayMatrix(double[][] matrix) {
        for (double[] row : matrix) {
            for (double value : row) {
                System.out.printf("%.2f ", value);
            }
            System.out.println();
        }
    }
}
```

Figure 29: Code exercise 6.6

Execute:

```
PS C:\Users\Admin\OneDrive - Hanoi University of Science and Technology\Documents\Code\OOP Lab
\IT3103.744528.2024.1.20225604.PhamQuocCuong\lab01> java Exercise.AddMatrix.src.AddMatrix
Pham Quoc Cuong - 5604 - Do you want to enter your own matrices? (yes/no): yes
Enter the number of rows for the matrices: 3
Enter the number of columns for the matrices: 2
Enter elements for the first matrix:
Element [0][0]: 5
Element [0][1]: 3
Element [1][0]: 2
Element [1][1]: 4
Element [2][0]: 1
Element [2][1]: 2
Enter elements for the second matrix:
Element [0][0]: 4
Element [0][1]: 1
Element [1][0]: 5
Element [1][1]: 3
Element [2][0]: 2
Element [2][1]: 3
Matrix 1:
5.00 3.00
2.00 4.00
1.00 2.00
Matrix 2:
4.00 1.00
5.00 3.00
2.00 3.00
Resulting matrix after addition:
9.00 4.00
7.00 7.00
3.00 5.00
```

```
PS C:\Users\Admin\OneDrive - Hanoi University of Science and Technology\Documents\Code\OOP Lab
\IT3103.744528.2024.1.20225604.PhamQuocCuong\lab01> java Exercise.AddMatrix.src.AddMatrix
Pham Quoc Cuong - 5604 - Do you want to enter your own matrices? (yes/no): no
Using predefined matrices.
Matrix 1:
1.50 2.30 3.70
4.10 5.80 6.00
7.90 8.20 9.50
Matrix 2:
9.10 8.40 7.20
6.30 5.70 4.40
3.60 2.50 1.80
Resulting matrix after addition:
10.60 10.70 10.90
10.40 11.50 10.40
11.50 10.70 11.30
```

Figure 30: Exercise result 6.6