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

BÁO CÁO THỰC HÀNH LAB 01

MÔN: LẬP TRÌNH HƯỚNG ĐỐI TƯỢNG

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The Very First Java Programs

2.2.1 Write, compile the first Java application

- Chương trình:

```java
//Bai 1
public class HelloWorld {
    Run | Debug
    public static void main (String[] args) {
        System.out.println(x:"Xin chao\n cac ban! Minh la Hong Phuc");
        System.out.println(x:"Hello\t world");
    }
}

```

- Kết quả

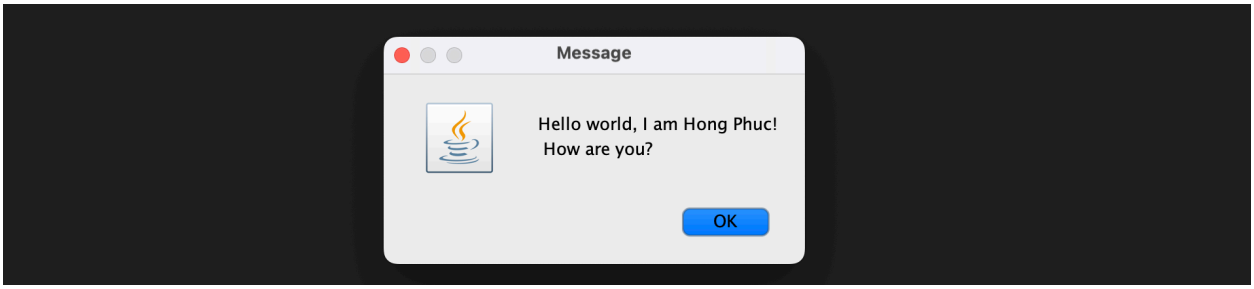
```
andrew_ta@Andrews-Macbook-Pro IT3103.744530.2024.1.20225906.TaHongPhuc % java HelloWorld
Xin chao
 cac ban! Minh la Hong Phuc
Hello    world
```

2.2.2 Write, compile the first dialog Java program

- Chương trình:

```java
//Bai 2
import javax.swing.JOptionPane;
public class FirstDialog {
    Run | Debug
    public static void main(String[] args) {
        JOptionPane.showMessageDialog(parentComponent:null, message:"Hello world, I am Hong Phuc!\n How are you?");
        System.exit(status:0);
    }
}

```

- Kết quả:

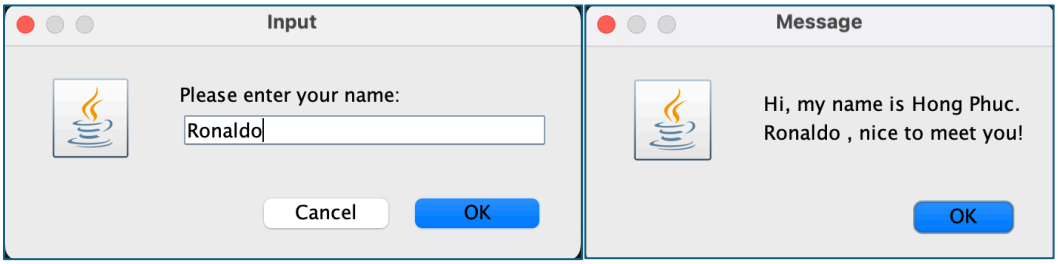


2.2.3 Write, compile the first input dialog Java application

- Chương trình:

```java
//Example 3
import javax.swing.JOptionPane;
public class HelloNameDialog{
    Run | Debug
    public static void main(String[] args) {
        String result;
        result = JOptionPane.showInputDialog(message:"Please enter your name:");
        JOptionPane.showMessageDialog(parentComponent:null,
        "Hi, my name is Hong Phuc.\n" + result + " , nice to meet you!");
        System.exit(status:0);
    }
}
```

- Kết quả:



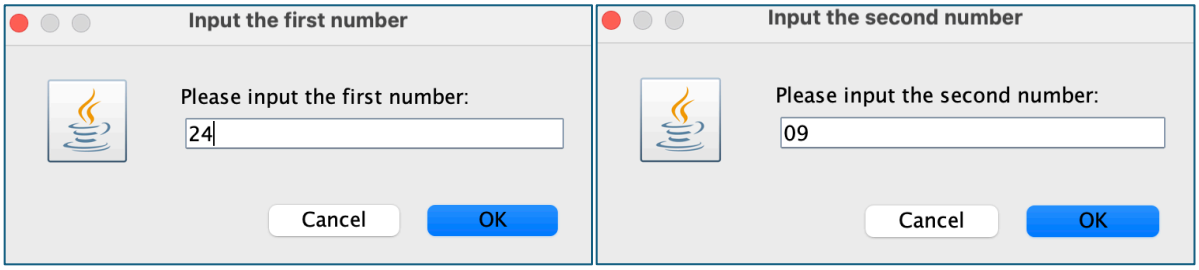
2.2.4 Write, compile and run the following example:

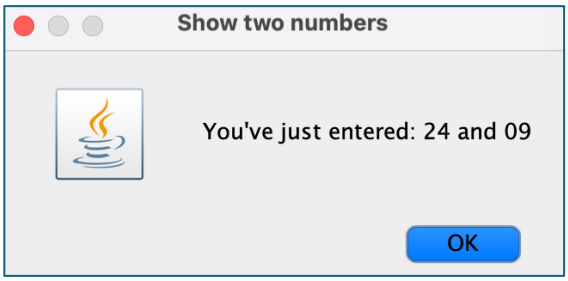
- Chương trình:

ShowTwoNumbers.java > ShowTwoNumbers

```java

// Example 5: ShowTwoNumbers.java
import javax.swing.JOptionPane;

public class ShowTwoNumbers {
    Run | Debug
    public static void main(String[] args){
        String strNum1, strNum2;
        String strNotification = "You've just entered: ";

        strNum1 = JOptionPane.showInputDialog(parentComponent:null,
            message:"Please input the first number:", title:"Input the first number",
                JOptionPane. INFORMATION_MESSAGE);
        strNotification += strNum1 + " and ";

        strNum2 = JOptionPane.showInputDialog(parentComponent:null,
            message:"Please input the second number:", title:"Input the second number",
                JOptionPane. INFORMATION_MESSAGE);
        strNotification += strNum2;

        JOptionPane. showMessageDialog(parentComponent:null,strNotification,
            title:"Show two numbers", JOptionPane. INFORMATION_MESSAGE);
        System.exit(status:0);
    }
}
```

- Kết quả:



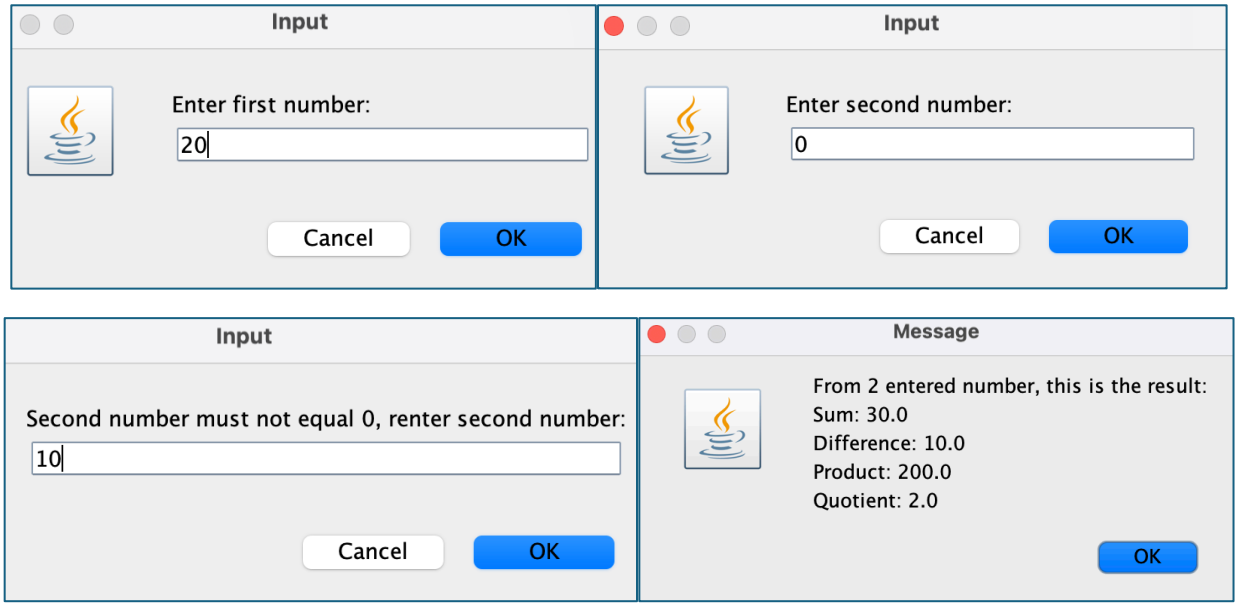


2.2.5 Write a program to calculate sum, difference, product, and quotient of 2 double numbers which are entered by users.

- Chương trình:

```
import javax.swing.JOptionPane;
public class Calculate {
    Run | Debug
    public static void main(String[] args) {
        String strNum1, strNum2;
        strNum1 = JOptionPane.showInputDialog(parentComponent:null, message:"Enter first number:");
        strNum2 = JOptionPane.showInputDialog(parentComponent:null, message:"Enter second number:");

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

        while (num2 == 0) {
            strNum2 = JOptionPane.showInputDialog(parentComponent:null,
            message:"Second number must not equal 0, renter second number:");
            num2 = Double.parseDouble(strNum2);
        }
        double sumNum = num1 + num2;
        double subNum = Math.abs(num1 - num2);
        double product = num1 * num2;
        double div = num1 / num2;

        JOptionPane.showMessageDialog(parentComponent:null,
        "From 2 entered number, this is the result:\nSum: "+sumNum+"\nDifference: "+subNum+"\nProduct: "+product+"\nQuotient: "+div);
    }
}
```

- Kết quả:



2.2.6 Write a program to solve problem:

- Chương trình:

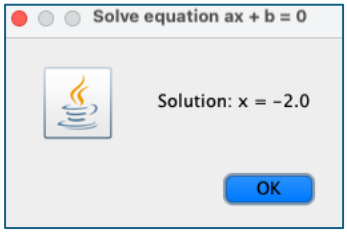
```java
package lab01;
import javax.swing.JOptionPane;
public class Equation {
    public static void firstDegreeEquation() {
        double a, b, result;

        do {
            String str1 = JOptionPane.showInputDialog(parentComponent:null,
                    message:"Please input a (a != 0):", title:"Input equation ax + b = 0", JOptionPane.INFORMATION_MESSAGE);
            a = Double.parseDouble(str1);

            if (a == 0) {
                JOptionPane.showMessageDialog(parentComponent:null, message:"Invalid input. 'a' cannot be 0. Please try again.");
            }
        } while (a == 0);

        String str2 = JOptionPane.showInputDialog(parentComponent:null,
                message:"Please input b:", title:"Input equation ax + b = 0", JOptionPane.INFORMATION_MESSAGE);
        b = Double.parseDouble(str2);

        result = -b / a;
        JOptionPane.showMessageDialog(parentComponent:null, "Solution: x = " + result,
                title:"Solve equation ax + b = 0", JOptionPane.INFORMATION_MESSAGE);
    }
```

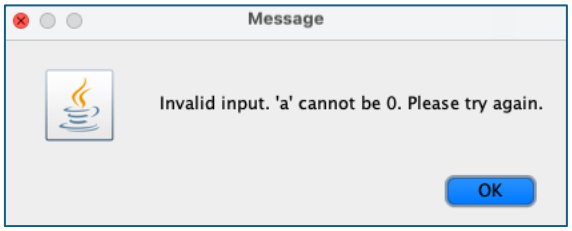
```java
public static void systemFirstDegreeEquation() {
    double[] a = new double[2];
    double[] b = new double[2];
    double[] c = new double[2];

    for (int i = 0; i < 2; i++) {
        String str1 = JOptionPane.showInputDialog(parentComponent:null,
                "Please input a" + (i + 1) + ":", "Input equation a" + (i + 1) + "x + b" + (i + 1) + "y = c" + (i + 1),
                JOptionPane.INFORMATION_MESSAGE);
        a[i] = Double.parseDouble(str1);

        String str2 = JOptionPane.showInputDialog(parentComponent:null,
                "Please input b" + (i + 1) + ":", "Input equation a" + (i + 1) + "x + b" + (i + 1) + "y = c" + (i + 1),
                JOptionPane.INFORMATION_MESSAGE);
        b[i] = Double.parseDouble(str2);

        String str3 = JOptionPane.showInputDialog(parentComponent:null,
                "Please input c" + (i + 1) + ":", "Input equation a" + (i + 1) + "x + b" + (i + 1) + "y = c" + (i + 1),
                JOptionPane.INFORMATION_MESSAGE);
        c[i] = Double.parseDouble(str3);
    }

    double D = a[0] * b[1] - a[1] * b[0];
    double Dx = c[0] * b[1] - c[1] * b[0];
    double Dy = a[0] * c[1] - a[1] * c[0];

    if (D != 0) {
        double x = Dx / D;
        double y = Dy / D;
        JOptionPane.showMessageDialog(parentComponent:null, "Solution: (" + x + ", " + y + ").",
                title:"Solve system of first-degree equations", JOptionPane.INFORMATION_MESSAGE);
    } else if (Dx == 0 && Dy == 0) {
        JOptionPane.showMessageDialog(parentComponent:null, message:"The system has infinitely many solutions.",
                title:"Solve system of first-degree equations", JOptionPane.INFORMATION_MESSAGE);
    } else {
        JOptionPane.showMessageDialog(parentComponent:null, message:"The system has no solution.",
                title:"Solve system of first-degree equations", JOptionPane.INFORMATION_MESSAGE);
    }
}

public static void secondDegreeEquation() {
    double a, b, c;

    do {
        String str1 = JOptionPane.showInputDialog(parentComponent:null,
                message:"Please input a (a != 0):", title:"Input equation ax^2 + bx + c = 0", JOptionPane.INFORMATION_MESSAGE);
        a = Double.parseDouble(str1);

        if (a == 0) {
            JOptionPane.showMessageDialog(parentComponent:null, message:"'a' cannot be 0. Please try again.");
        }
    } while (a == 0);

    String str2 = JOptionPane.showInputDialog(parentComponent:null,
            message:"Please input b:", title:"Input equation ax^2 + bx + c = 0", JOptionPane.INFORMATION_MESSAGE);
    b = Double.parseDouble(str2);

    String str3 = JOptionPane.showInputDialog(parentComponent:null,
            message:"Please input c:", title:"Input equation ax^2 + bx + c = 0", JOptionPane.INFORMATION_MESSAGE);
    c = Double.parseDouble(str3);

    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);
        JOptionPane.showMessageDialog(parentComponent:null, "Solution: x1 = " + x1 + ", x2 = " + x2,
                title:"Solve equation ax^2 + bx + c = 0", JOptionPane.INFORMATION_MESSAGE);
    } else if (delta == 0) {
        double x = -b / (2 * a);
        JOptionPane.showMessageDialog(parentComponent:null, "Solution: x1 = x2 = " + x,
                title:"Solve equation ax^2 + bx + c = 0", JOptionPane.INFORMATION_MESSAGE);
    } else {
        JOptionPane.showMessageDialog(parentComponent:null, message:"The equation has no solution.",
                title:"Solve equation ax^2 + bx + c = 0", JOptionPane.INFORMATION_MESSAGE);
    }
}
```

```
103     public static void main(String[] args) {
104         String option;
105 
106         do {
107             option = JOptionPane.showInputDialog(parentComponent:null,
108                     "Please select a program: \n"
109                             + "1. Solve the first-degree equation with one variable\n"
110                             + "2. Solve the system of first-degree equations with two variables\n"
111                             + "3. Solve the second-degree equation with one variable\n"
112                             + "4. Exit\n",
113                     title:"Equation Solver", JOptionPane.INFORMATION_MESSAGE);
114 
115             switch (option) {
116                 case "1":
117                     firstDegreeEquation();
118                     break;
119                 case "2":
120                     systemFirstDegreeEquation();
121                     break;
122                 case "3":
123                     secondDegreeEquation();
124                     break;
125                 case "4":
126                     JOptionPane.showMessageDialog(parentComponent:null, message:"Program terminated.");
127                     System.exit(status:0);
128                 default:
129                     JOptionPane.showMessageDialog(parentComponent:null, message:"Invalid option! Please try again.");
130             }
131         } while (true);
132     }
133 }
134 
```

- Kết quả:

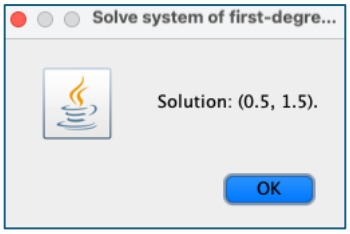
  PT bậc nhất 1 ẩn: a = 1, b = 2 và xử lí a = 0



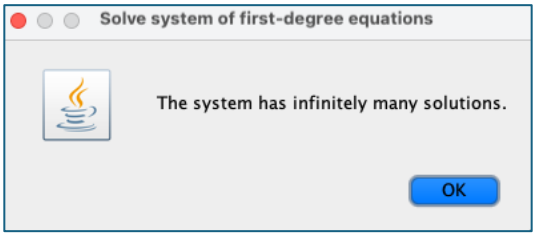


  HPT bậc nhất 2 ẩn:

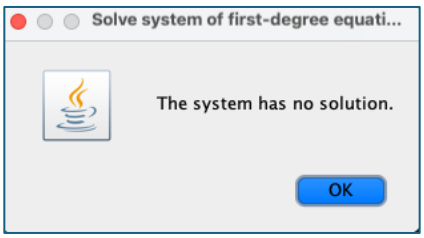
  (a,b,c): (-1,1,1) và (1,1,2)



  (a,b,c): (1,1,1) và (1,1,1)

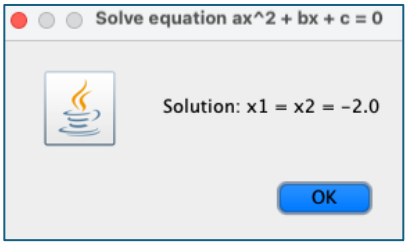


(a,b,c): (1,1,1) và (1,1,2)

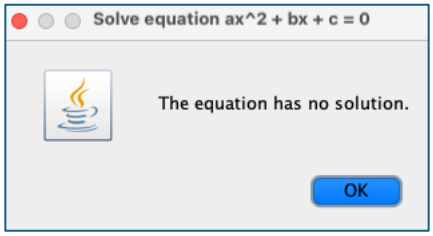


PT bậc hai 1 ẩn:

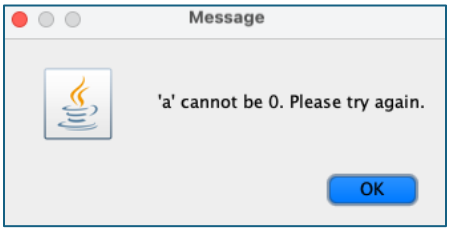
+) a = 1, b = c = 4



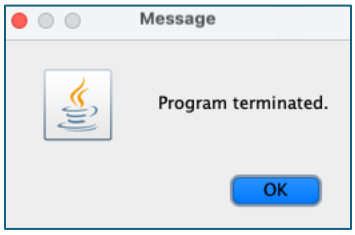
+) a = 1, b = c = 2

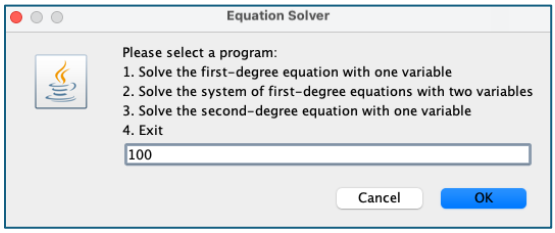


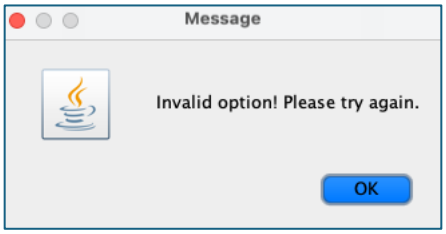
+) a = 0



Ngoại lệ:







6. Exercises

6.1 Write, compile and run the ChoosingOption program

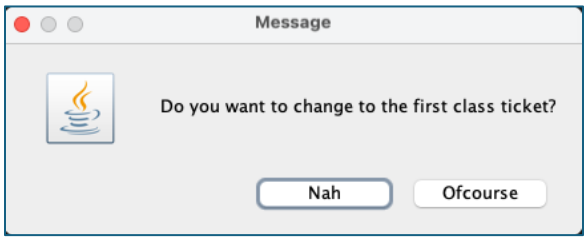
- Khi người dùng chọn Cancel -> NO

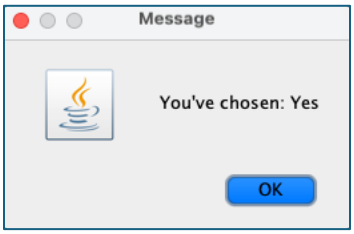
⇨ Chuyển thành từ ngữ giao tiếp: “Nah” và “Of course”

- Chương trình:

```java
package lab01;

import javax.swing.JFrame;
import javax.swing.JOptionPane;

public class ChoosingOption {
    Run | Debug
    public static void main(String[] args) {
        JFrame frame = new JFrame();
        String[] options = new String[2];
        options[0] = "Ofcourse";
        options[1] = "Nah";
        int option = JOptionPane.showOptionDialog(frame.getContentPane(),
        message:"Do you want to change to the first class ticket?", title:"Message", optionType:0,
        JOptionPane.INFORMATION_MESSAGE, icon:null, options, initialValue:null);

        JOptionPane.showMessageDialog(parentComponent:null,
        "You've chosen: " + (option == JOptionPane.YES_OPTION ? "Yes" : "No"));

        System.exit(option);
    }
}

```

- Kết quả:





6.2 Write a program for input/output from keyboard

- Chương trình:

```java
package lab01;

import java.util.Scanner;

public class InputFromKeyboard {
    Run | Debug
    public static void main(String[] args) {
        Scanner sacnner = new Scanner(System.in);
        System.out.println(x:"Please enter your name: ");
        String name = sacnner.nextLine();
        System.out.println(x:"How old are you? ");
        int age = sacnner.nextInt();
        System.out.println(x:"How tall are you? (cm) ");
        double height = sacnner.nextDouble();

        System.out.println("I am Hong Phuc, Hi " + name + ", " + age + " years old, your heigt is " + height + "cm.");

        sacnner.close();
    }
}
```

- Kết quả:

```
Please enter your name:
Andrew
How old are you?
18
How tall are you? (cm)
173
I am Hong Phuc, Hi Andrew, 18 years old, your heigt is 173.0cm.
```

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

- Chương trình + kết quả:

```java
package lab01;
import java.util.Scanner;

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

        System.out.print(s:"Nhập n: ");
        int n = scanner.nextInt();

        for (int i = 0; i < n; i++) {

            for (int k = i; k <= n; k++) {
                System.out.print(s:" ");
            }

            for (int j = 0; j < (2 * i + 1); j++) {
                System.out.print(s:"*");
            }
            System.err.print(s:"\n");
        }
        scanner.close();
    }
}
```

```
Nhập n: 8
        *
       ***
      *****
     *******
    *********
   ***********
  *************
 ***************
```

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.

- Chương trình:

```java
package lab01;
import java.util.Scanner;

public class DayMonth {
    Run | Debug
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);
        System.out.println(x:"Nhập năm:");
        int year = scanner.nextInt();
        while(year < 0){
            System.out.println(x:"Vui lòng nhập năm hợp lệ: ");
            year = scanner.nextInt();
        }
        scanner.nextLine();
        System.out.println(x:"Nhập tháng:");
        String month = scanner.nextLine();


        while (true) {
            switch (month) {
                case "1","3","5","7","8","10","12":
                case "Jan", "Mar", "May", "Jul", "Aug", "Oct", "Dec":
                case "Jan.", "Mar.", "May.", "Jul.", "Aug.", "Oct.", "Dec.":
                case "January", "March", "July", "August", "October", "December":
                    System.out.println(String.format(format:"There is 31 days", year));
                    break;
                case "4","6","9","11":
                case "Apr", "Jun", "Sep", "Nov":
                case "Apr.", "Jun.", "Sep.", "Nov.":
                case "April", "June", "September", "November":
                    System.out.println(String.format(format:"There is 30 days", year));
                    break;
                case "2", "Feb", "Feb.", "Febuary":
                    {
                        if (year % 4 == 0){
                            if (year % 100 == 0 && year % 400 != 0){
                                System.out.println(String.format(format:"There is 28 days", year));
                            }
                            else System.out.println(String.format(format:"There is 29 days", year));
                        }
                        else System.out.println(String.format(format:"There is 28 days", year));
                    }
                    break;
                default:{
                    System.out.println(x:"Vui lòng nhập tháng hợp lệ: ");
                    month = scanner.nextLine();
                }
            }
            scanner.close();
            return ;
        }
    }
}
```

- Kết quả:

  Xét riêng trường hợp tháng 2:

```
Nhập năm:
2024
Nhập tháng:
2
There is 29 days
```

```
Nhập năm:
2024
Nhập tháng:
Feb.
There is 29 days
```

```
Nhập năm:
2025
Nhập tháng:
Febuary
There is 28 days
```

  Trường hợp ngẫu nhiên:

```
Nhập năm:
2020
Nhập tháng:
Jan
There is 31 days
```

```
Nhập năm:
2004
Nhập tháng:
June
There is 30 days
```

```
Nhập năm:
2010
Nhập tháng:
Oct.
There is 31 days
```

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

- Chương trình:

```java
package lab01;

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

public class SortSumAvg {
    Run | Debug
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);
        System.out.print(s:"Enter size of array: ");
        int size = scanner.nextInt();
        int[] arr = new int[size];

        for(int i=0; i<size; i++) {
            System.out.print("Enter the " + (i+1) + " element: ");
            arr[i] = scanner.nextInt();
        }

        System.out.println("Your array: " + Arrays.toString(arr));

        Arrays.sort(arr);

        int sum = 0;
        for(int i = 0; i < size; i++) {
            sum += arr[i];
        }

        System.out.println("Sorted array: " + Arrays.toString(arr));
        System.out.println("Sum: " + sum);
        System.out.println("Average: " + (double)sum/size);

        scanner.close();
    }
}
```

- Kết quả:

```
Enter size of array: 3
Enter the 1 element: 20
Enter the 2 element: 10
Enter the 3 element: 30
Your array: [20, 10, 30]
Sorted array: [10, 20, 30]
Sum: 60
Average: 20.0
```

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

- Chương trình:

```java
package lab01;

import java.util.Scanner;

public class Matrix {
    Run | Debug
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);
        int rows, columns;
        System.out.print(s:"Please enter the numbers of row: ");
        rows = scanner.nextInt();
        System.out.print(s:"Please enter the numbers of column: ");
        columns = scanner.nextInt();
        double[][] firstMatrix = new double[rows][columns];
        double[][] secondMatrix = new double[rows][columns];

        for(int i=0; i<rows; i++){
            for(int j=0; j<columns; j++){
                System.out.print("Enter A" + "[" + (i+1) + "]" + "[" + (j+1) + "]: ") ;
                firstMatrix[i][j] = scanner.nextDouble();
            }
        }

        for(int i=0; i<rows; i++){
            for(int j=0; j<columns; j++){
                System.out.print("Enter B" + "[" + (i+1) + "]" + "[" + (j+1) + "]: ") ;
                secondMatrix[i][j] = scanner.nextDouble();
            }
        }

        double[][] sum = new double[rows][columns];
        for(int i=0; i<rows; i++){
            for(int j=0; j<columns; j++){
                sum[i][j] = firstMatrix[i][j] + secondMatrix[i][j];
            }
        }

```

```
        System.out.println(x:"Sum: ");
        for(int i=0; i<rows; i++){
            for(int j=0; j<columns; j++){
                System.out.print(sum[i][j] + "   ");
            }
            System.out.println();
        }

        scanner.close();
    }
}
```

- Kết quả:

```
Please enter the numbers of row: 2
Please enter the numbers of column: 2
Enter A[1][1]: 1
Enter A[1][2]: 2
Enter A[2][1]: 3
Enter A[2][2]: 4
Enter B[1][1]: 4
Enter B[1][2]: 3
Enter B[2][1]: 2
Enter B[2][2]: 1
Sum:
5.0   5.0
5.0   5.0
```