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

BÁO CÁO THỰC HÀNH LAB 01

MÔN: LẬP TRÌNH HƯỚNG ĐỐI TƯỢNG

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Hà Nội, tháng 9 năm 2024

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The Very First Java Programs

2.2.1 Write, compile the first Java application

```java
public class HelloWorld {
    Run main | Debug main
    public static void main(String[] args) {
        System.out.println("Hello! \n");
        System.out.println("Toi la Nguyen Manh Tung 20225682 \n");
        System.out.println("Rat vui khi duoc gap ban!!!");
    }
}

```

Kết quả:

```
PS C:\Users\tungn\Downloads\Hoc tap\2024-1\oop_lab\IT3103.744530.2024.1.20225682.NguyenManhTung\lab01> java .\HelloWorld.java
Hello!

Toi la Nguyen Manh Tung 20225682

Rat vui khi duoc gap ban!!!
```

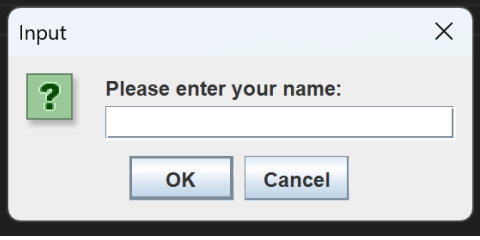
2.2.2 Write, compile the first dialog Java program

```java
import javax.swing.JOptionPane;

public class FirstDialog {
    Run main | Debug main
    public static void main(String[] args) {
        JOptionPane.showMessageDialog(null, "Hello! Toi la Tung 20225682. Rat vui khi gap ban");
        System.exit(0);
    }
}

```

Kết quả:

2.2.3 Write, compile the first input dialog Java application

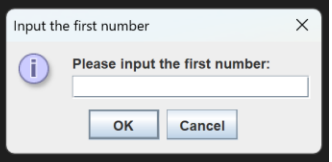
```java
import javax.swing.JOptionPane;

public class HelloNameDialog {
    Run main | Debug main
    public static void main(String[] args) {
        String result;
        result = JOptionPane.showInputDialog("Please enter your name:");
        JOptionPane.showMessageDialog(null, "Toi la Tung. Xin chao " + result + "!");
        System.exit(0);
    }
}
```

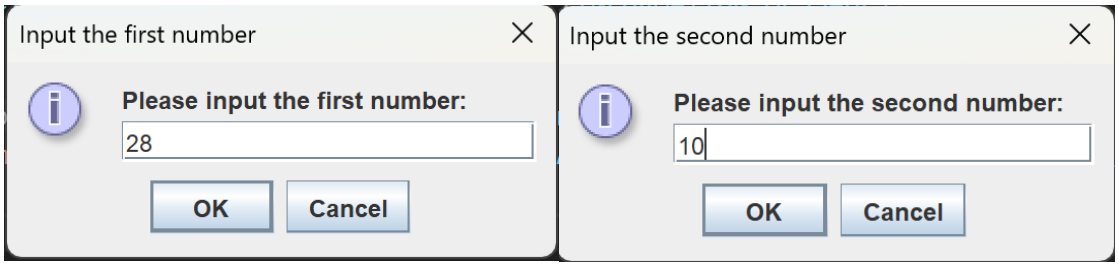


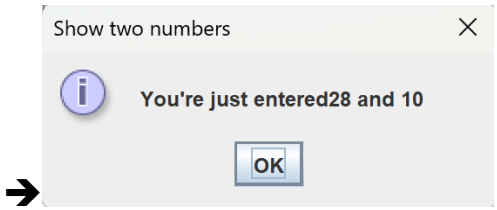
Kết quả:

2.2.4 Write, compile, and run the following example

```java
import javax.swing.JOptionPane;

public class ShowTwoNumbers {
    Run | Debug
    public static void main(String[] args) {
        String strNum1, strNum2;
        String strNotification = "You're 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);
    }
}
```



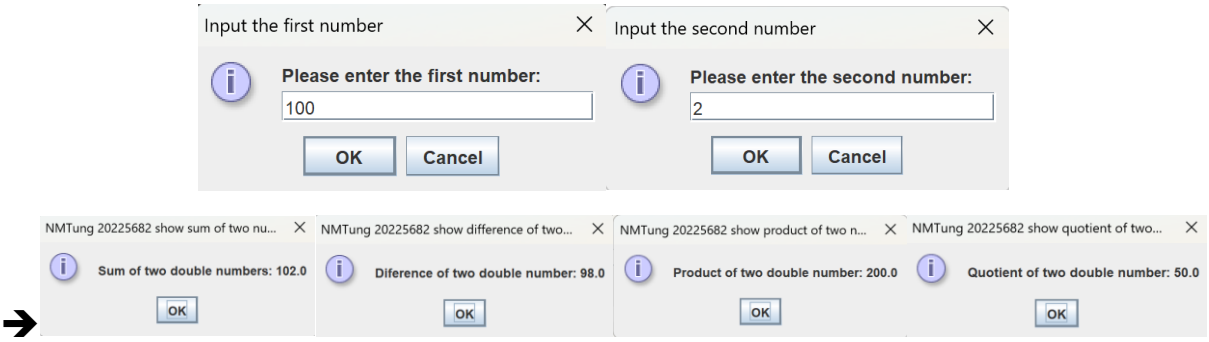




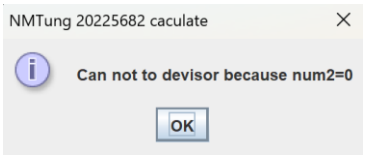
2.2.5 Write a program to calculate sum, difference, product, and quotient of 2 double numbers which are entered by users

```java
import javax.swing.JOptionPane;

public class Caculate {
    Run | Debug
    public static void main(String[] args) {
        String strNum1, strNum2;
        String strSum = "Sum of two double numbers: ";
        String strDifference = "Diference of two double number: ";
        String strProduct = "Product of two double number: ";
        String strQuotient = "Quotient of two double number: ";
        strNum1 = JOptionPane.showInputDialog(parentComponent:null,
                message:"Please enter the first number:",title:"Input the first number",
                JOptionPane.INFORMATION_MESSAGE);
        double num1 = Double.parseDouble(strNum1);
        strNum2 = JOptionPane.showInputDialog(parentComponent:null,
                message:"Please enter the second number:",title:"Input the second number",
                JOptionPane.INFORMATION_MESSAGE);
        double num2 = Double.parseDouble(strNum2);
        strSum += num1 + num2;
        strDifference += Math.abs(num1 - num2);
        strProduct += num1 * num2;
        JOptionPane.showMessageDialog(parentComponent:null, strSum,
                    title:"NMTung 20225682 show sum of two numbers", JOptionPane.INFORMATION_MESSAGE);
        JOptionPane.showMessageDialog(parentComponent:null, strDifference,
                    title:"NMTung 20225682 show difference of two numbers", JOptionPane.INFORMATION_MESSAGE);
        JOptionPane.showMessageDialog(parentComponent:null, strProduct,
                    title:"NMTung 20225682 show product of two numbers", JOptionPane.INFORMATION_MESSAGE);
        //check division
        if(num2 == 0) {
            JOptionPane.showMessageDialog(parentComponent:null, message:"Can not to devisor because num2=0",
                        title:"NMTung 20225682 caculate", JOptionPane.INFORMATION_MESSAGE);
        } else {
            strQuotient += num1 / num2;
            JOptionPane.showMessageDialog(parentComponent:null, strQuotient,
                        title:"NMTung 20225682 show quotient of two numbers", JOptionPane.INFORMATION_MESSAGE);
        }
        System.exit(status:0);
    }
}
```

Kết quả:



- Nếu số thứ 2 bằng 0:



2.2.6 Write a program to solve

```
import javax.swing.JOptionPane;

public class SolveEquation {
    //Giai pt bac nhat
    public static void FirstDegreeEquation() {
        String str1, str2;
        double a=1, b, result;

        //check a
        do {
            if( a==0 ) {
                JOptionPane.showMessageDialog(parentComponent:null, "Invalid because a is can not equal 0"
                                    + "Please try again");
            }

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

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

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

    //Giai he phuong trinh bac nhat
    public static void SystemFirstDegreeEquation() {
        String str1, str2, str3;
        double[] a = new double[2];
        double[] b = new double[2];
        double[] c = new double[2];
        double D, Dx, Dy, x, y;
```

```
        //input a1, b1, c1
        str1 = JOptionPane.showInputDialog(parentComponent:null,
                message:"Please input a: ",title:"Input the first degree quation ax + by = c", JOptionPane.INFORMATION_MESSAGE);
        a[0] = Double.parseDouble(str1);
        str2 = JOptionPane.showInputDialog(parentComponent:null,
                message:"Please input b: ",title:"Input the first degree quation ax + by = c", JOptionPane.INFORMATION_MESSAGE);
        b[0] = Double.parseDouble(str2);
        str3 = JOptionPane.showInputDialog(parentComponent:null,
                message:"Please input c: ",title:"Input the first degree quation ax + by = c", JOptionPane.INFORMATION_MESSAGE);
        c[0] = Double.parseDouble(str3);

        //input a2, b2, c3
        str1 = JOptionPane.showInputDialog(parentComponent:null,
                message:"Please input a: ",title:"Input the first degree quation ax + by = c", JOptionPane.INFORMATION_MESSAGE);
        a[1] = Double.parseDouble(str1);
        str2 = JOptionPane.showInputDialog(parentComponent:null,
                message:"Please input b: ",title:"Input the first degree quation ax + by = c", JOptionPane.INFORMATION_MESSAGE);
        b[1] = Double.parseDouble(str2);
        str3 = JOptionPane.showInputDialog(parentComponent:null,
                message:"Please input c: ",title:"Input the first degree quation ax + by = c", JOptionPane.INFORMATION_MESSAGE);
        c[1] = Double.parseDouble(str3);

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

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

    //Giai phuong trinh bac hai
    public static void SecondDegreeEquation() {
        String str1, str2, str3;
        double a=1, b, c;
        double delta, x1, x2;

        do {
            if (a == 0 ) {
                JOptionPane.showMessageDialog(parentComponent:null, "Invalid because a can not equal 0"
                                    + "Please try again");
            }
            str1 = JOptionPane.showInputDialog(parentComponent:null,
            message:"Please input a: ",title:"Input euqation ax^2 + bx +c = 0", JOptionPane.INFORMATION_MESSAGE);
            a = Double.parseDouble(str1);
        } while ( a==0 );
```

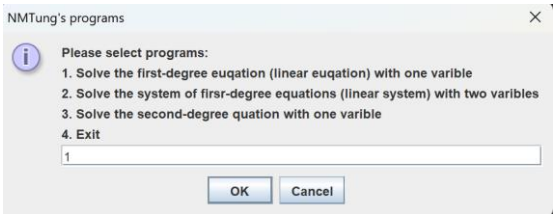
```
        //input b, c
        str2 = JOptionPane.showInputDialog(parentComponent:null,
            message:"Please input b: ",title:"Input euqation ax^2 + bx +c = 0", JOptionPane.INFORMATION_MESSAGE);
        b = Double.parseDouble(str2);
        str3 = JOptionPane.showInputDialog(parentComponent:null,
            message:"Please input c: ",title:"Input euqation ax^2 + bx +c = 0", JOptionPane.INFORMATION_MESSAGE);
        c = Double.parseDouble(str3);
```

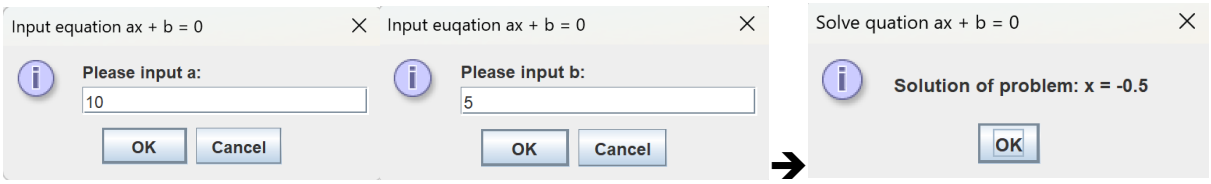
```
106         //solve
107         delta = b * b - 4 * a * c;
108         if( delta > 0 ) {
109             x1 = (-b + Math.sqrt(delta)) / 2*a;
110             x2 = (-b - Math.sqrt(delta)) / 2*a;
111             JOptionPane.showMessageDialog(parentComponent:null, "Solution of this problem: x1 = " + x1 + " and x2 = " + x2,
112             title:"Solve equation of ax^2 + bx + c = 0", JOptionPane.INFORMATION_MESSAGE);
113         } else if ( delta == 0 ) {
114             x1 = -b / 2*a;
115             x2 = x1;
116             JOptionPane.showMessageDialog(parentComponent:null, "Solution of this problen: x1 = x2 = " + x1,
117             title:"Solve equation of ax^2 + bx + c = 0", JOptionPane.INFORMATION_MESSAGE);
118         } else {
119             JOptionPane.showMessageDialog(parentComponent:null, message:"This system of euqation has no solution",
120             title:"Solve equation of ax^2 + bx + c = 0", JOptionPane.INFORMATION_MESSAGE);
121         }
122     }
123
```

```
    Run | Debug
124     public static void main(String[] args) {
125         String option;
126
127         option = JOptionPane.showInputDialog(parentComponent:null,
128         "Please select programs: \n"
129         + "1. Solve the first-degree euqation (linear euqation) with one varible \n"
130         + "2. Solve the system of firsr-degree equations (linear system) with two varibles \n"
131         + "3. Solve the second-degree quation with one varible \n"
132         + "4. Exit \n",
133         title:"NMTung's programs", JOptionPane.INFORMATION_MESSAGE
134         );
135
136         switch (option) {
137             case "1":
138                 FirstDegreeEquation();
139                 main(args:null);
140                 break;
141             case "2":
142                 SystemFirstDegreeEquation();
143                 main(args:null);
144                 break;
145             case "3":
146                 SecondDegreeEquation();
147                 main(args:null);
148                 break;
149             case "4":
150                 JOptionPane.showMessageDialog(parentComponent:null, message:"Program is stopped");
151                 System.exit(status:0);
152             default:
153                 JOptionPane.showMessageDialog(parentComponent:null, message:"Invalid optin! Please try again");
154                 main(args:null);
155         }
156     }
157 }
```

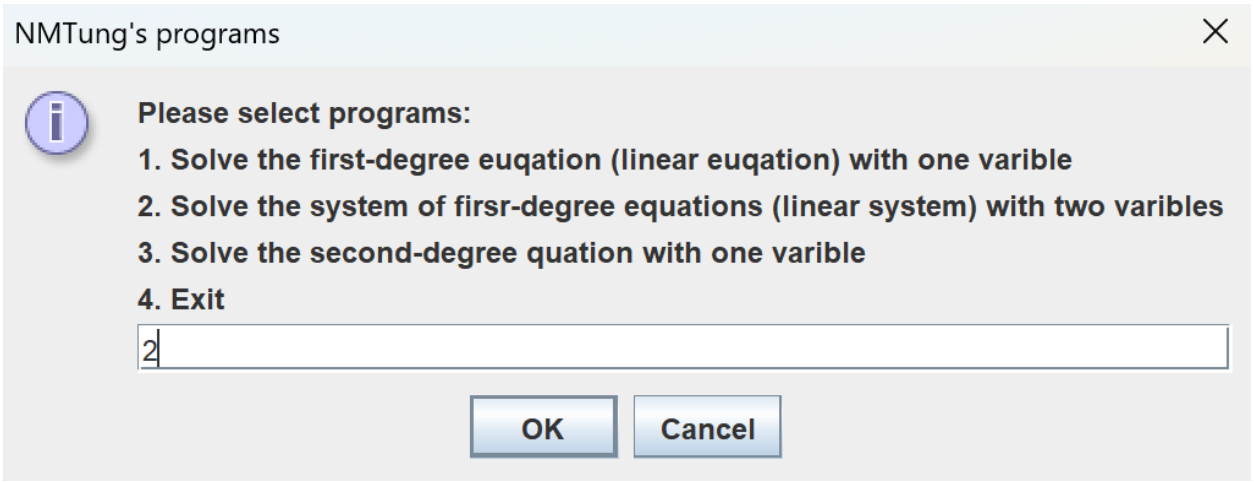
Kết quả:

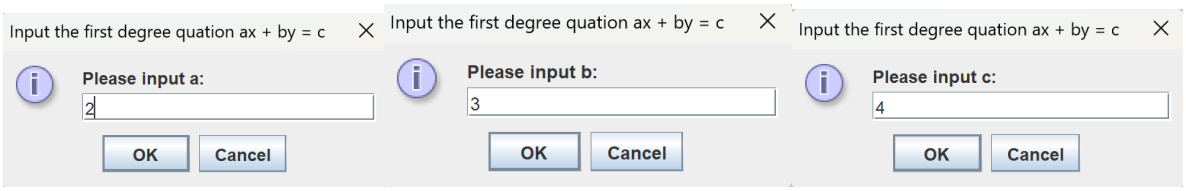
- Phương trình bậc nhất:

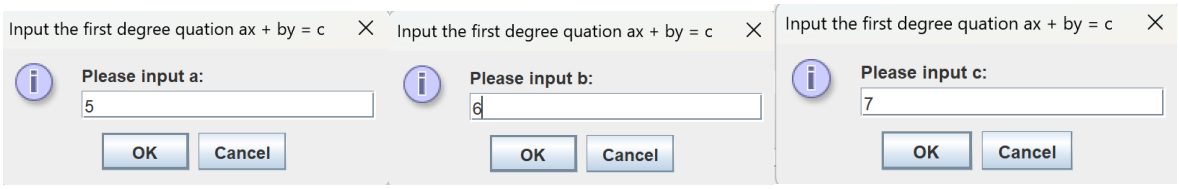


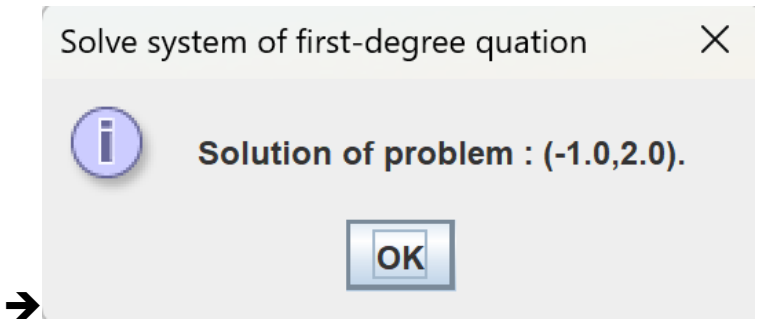


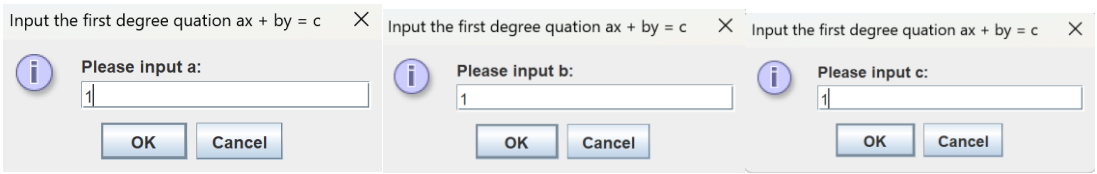
- Hệ phương trình bậc nhất:

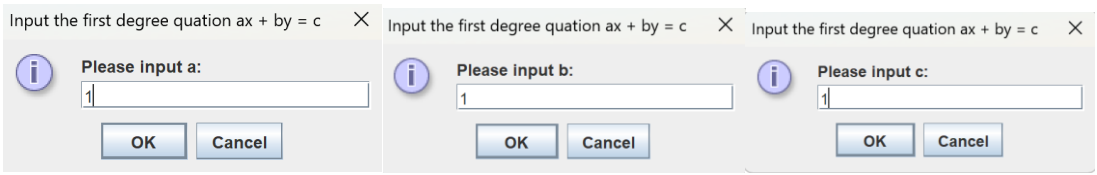


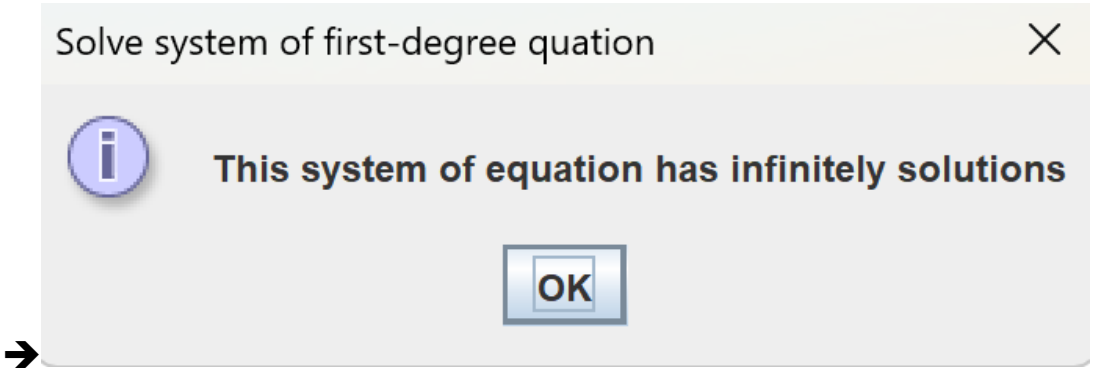


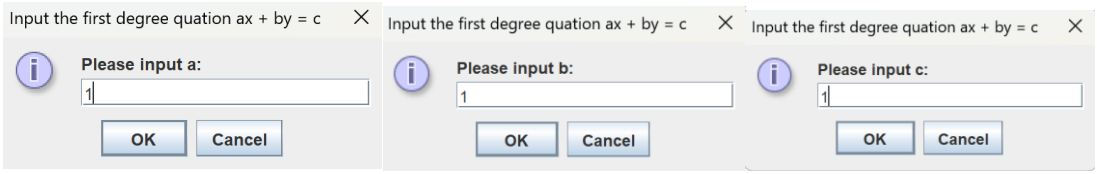


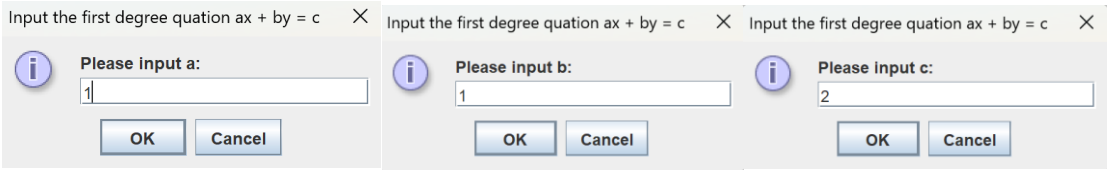


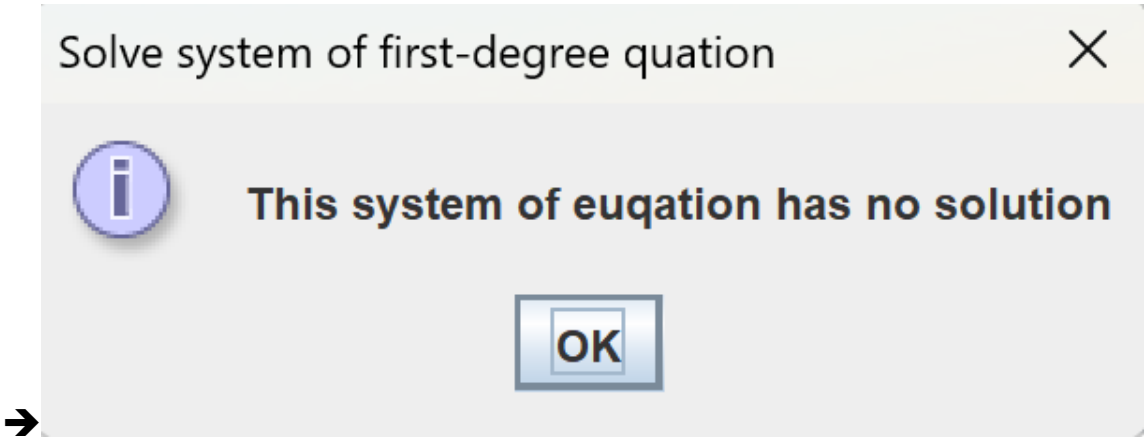

Input the first degree quation ax + by = c
Please input a:
1
OK
Cancel
Input the first degree quation ax + by = c
Please input b:
1
OK
Cancel
Input the first degree quation ax + by = c
Please input c:
1
OK
Cancel


Input the first degree quation ax + by = c
Please input a:
1
OK
Cancel
Input the first degree quation ax + by = c
Please input b:
1
OK
Cancel
Input the first degree quation ax + by = c
Please input c:
1
OK
Cancel

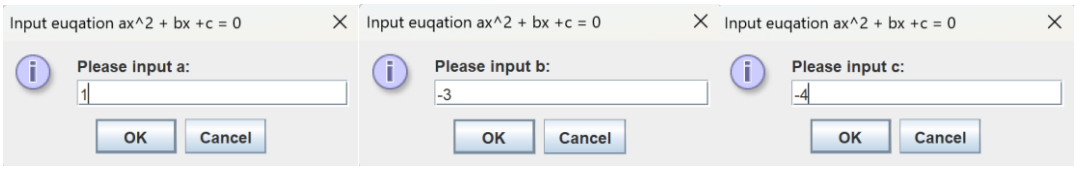

Solve system of first-degree quation
This system of equation has infinitely solutions
OK

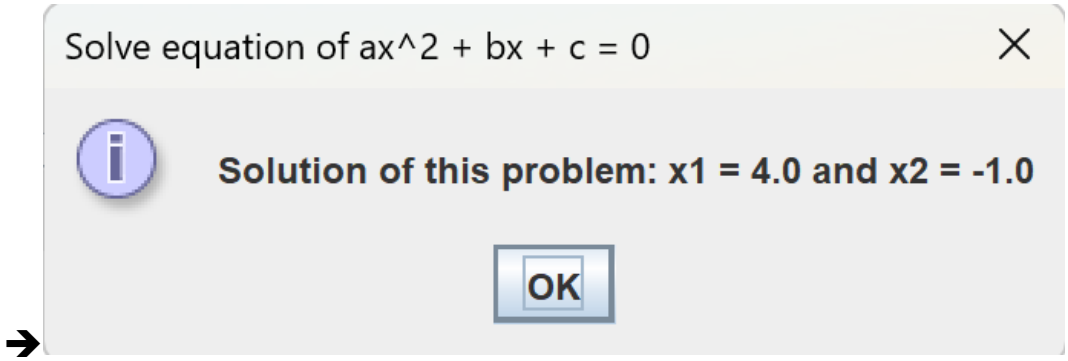

Input the first degree quation ax + by = c
Please input a:
1
OK
Cancel
Input the first degree quation ax + by = c
Please input b:
1
OK
Cancel
Input the first degree quation ax + by = c
Please input c:
1
OK
Cancel

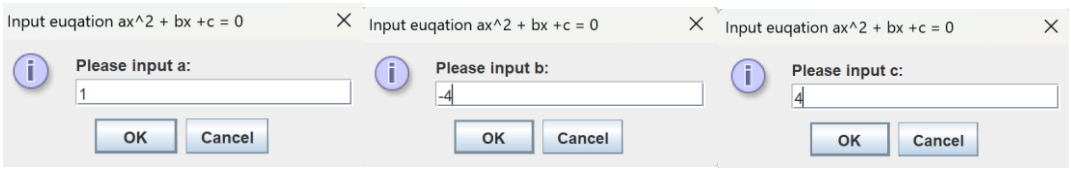

Input the first degree quation ax + by = c
Please input a:
1
OK
Cancel
Input the first degree quation ax + by = c
Please input b:
1
OK
Cancel
Input the first degree quation ax + by = c
Please input c:
2
OK
Cancel

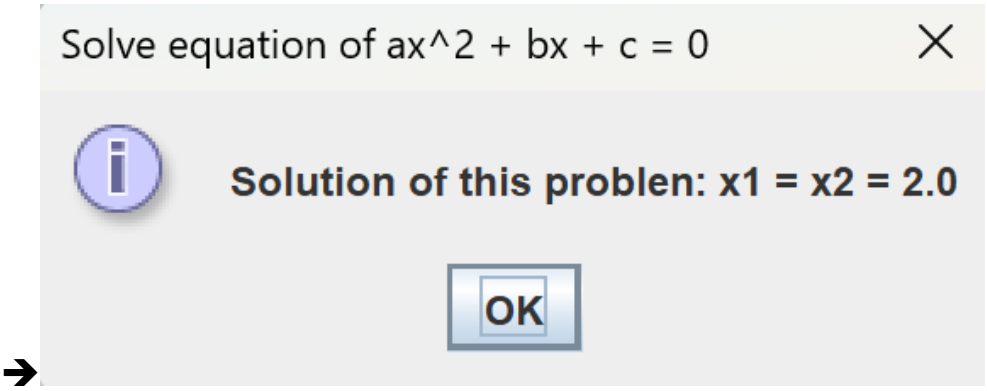

Solve system of first-degree quation
This system of euqation has no solution
OK

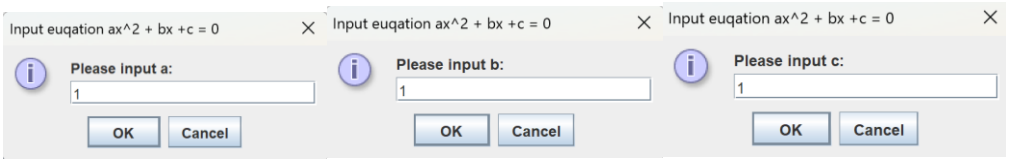
- Phương trình bậc hai một ẩn:

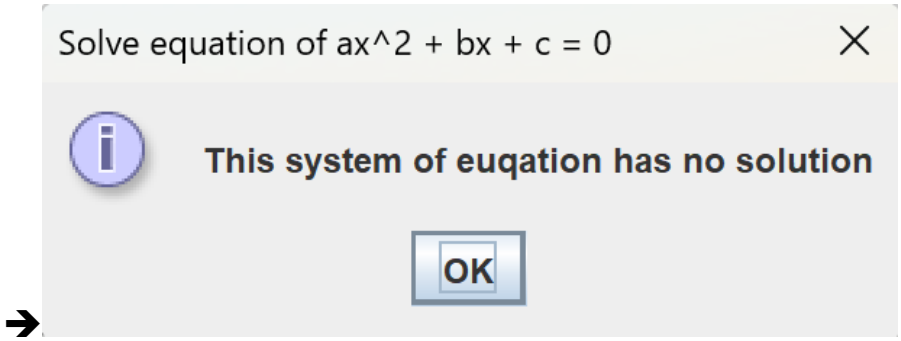




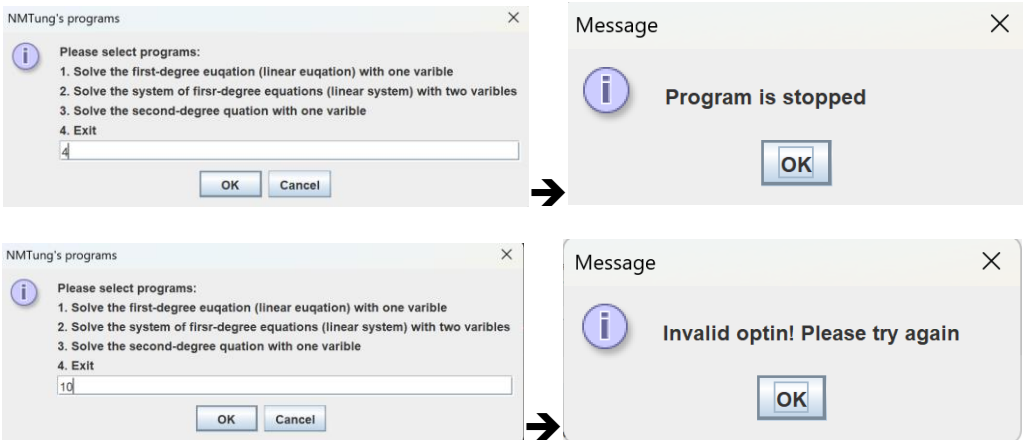








- Ngoại lệ:

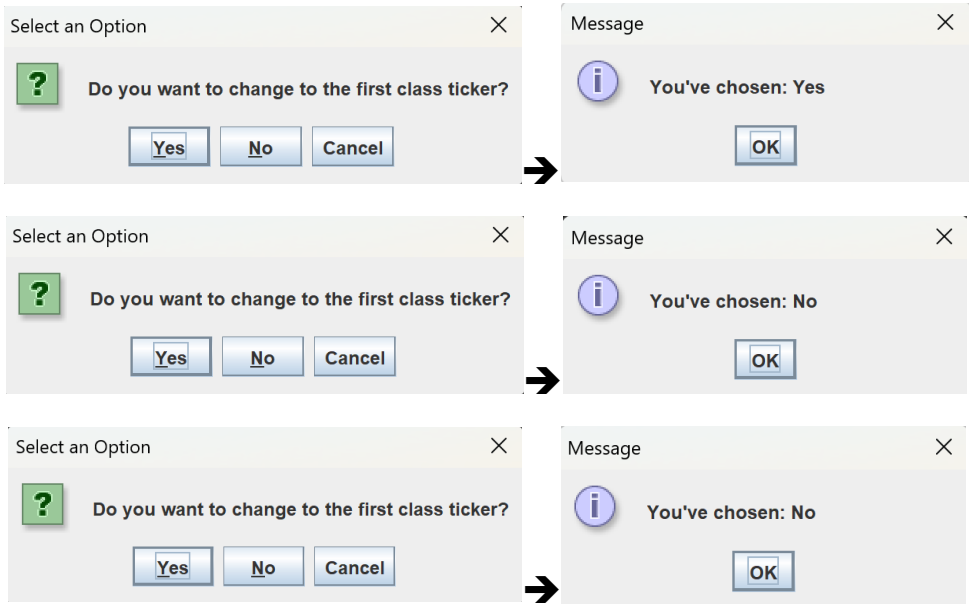


Exercise

6.1 Write, compile and run the ChoosingOption program

```java
package lab01;

import javax.swing.JOptionPane;

public class ChoosingOption {
    Run | Debug
    public static void main(String[] args) {
        int option = JOptionPane.showConfirmDialog(parentComponent:null,
        message:"Do you want to change to the first class ticker?");

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

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

Kết quả:

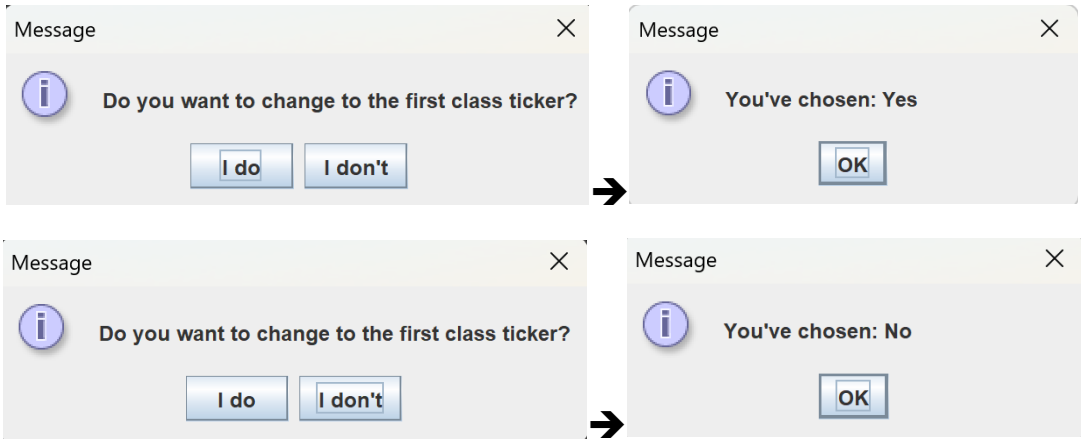


- Answer questions:

- What happens if users choose “Cancel”? ➔ No
- How to customize the options to users, e.g. only two options: “Yes” and “No”, OR “I do” and “I don’t”

```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] = "I do";
        options[1] = "I don't";
        int option = JOptionPane.showOptionDialog(frame.getContentPane(),
        message:"Do you want to change to the first class ticker?", 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

```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("My name is NMTung, Hello " + name + ", " + age + " years old, your heigt is " + height + "cm.");

        sacnner.close();
    }
}
```

Kết quả:

```
Please enter your name:
Khanh
How old are you?
12
How tall are you? (cm)
165
My name is NMTung, Hello Khanh, 12 years old, your heigt is 165.0cm.
```

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

```java
package lab01;

import java.util.Scanner;

public class TriangleStar {
    Run | Debug
    public static void main(String[] args) {
        Scanner sacnner = new Scanner(System.in);
        System.out.println(x:"Please enter n: ");
        int n = sacnner.nextInt();

        for(int i=1; i<=n; i++){
            for(int j=i; j<n; j++){
                System.out.print(s:" ");
            }
            for(int j=1; j<=(2*i-1); j++){
                System.out.print(s:"*");
            }
            System.out.println();
        }

        sacnner.close();
    }
}
```

Kết quả:

```
Please enter n:
5
    *
   ***
  *****
 *******
*********
```

6.4 Write a program to display the number of days of a month

```java
package lab01;

import java.util.Scanner;

public class NumberOfDayOfMonth {
    //check valid month
    private static boolean isValidMonth (String month) {
        return month.matches(
            "^(january|ran\\.|jan|1|"
            + "february|feb\\.|feb|2|"
            + "march|mar\\.|mar|3|"
            + "april|apr\\.|apr|4|"
            + "may|5|"
            + "june|jun\\.|jun|6|"
            + "july|jul\\.|jul|7|"
            + "august|aug\\.|aug|8|"
            + "september|sep\\.|sep|9|"
            + "october|oct\\.|oct|10|"
            + "november|nov\\.|nov|11|"
            + "december|dec\\.|dec|12|)$"
        );
    }
```

```java
    //check valid year
    private static boolean isValidYear (String yearStr) {
        return yearStr.matches(regex:"^\\d{4}$");
    }

    //get days of month in year
    private static int getDayInMonth (String month, int year) {
        int days = 0;
        switch (month) {
            case "january":
            case "jan\\.":
            case "jan":
            case "1":
            case "march":
            case "mar\\.":
            case "mar":
            case "3":
            case "may":
            case "5":
            case "july":
            case "jul\\.":
            case "jul":
            case "7":
            case "august":
            case "aug\\.":
            case "aug":
            case "8":
            case "october":
            case "oct\\.":
            case "oct":
            case "10":
            case "december":
            case "dec\\.":
            case "dec":
            case "12":
                days = 31;
                break;
```

```java
            case "april":
            case "apr\\.":
            case "apr":
            case "4":
            case "june":
            case "jun\\.":
            case "jun":
            case "6":
            case "september":
            case "sep\\.":
            case "sep":
            case "9":
            case "november":
            case "nov\\.":
            case "nov":
            case "11":
                days = 30;
                break;

            case "february":
            case "feb\\.":
            case "feb":
            case "2":
                days = isLeapYear(year) ? 29 : 28;
                break;
        }
        return days;
    }
```

```java
    private static boolean isLeapYear (int year) {
        return (year % 4 == 0 && year % 100 != 0) || (year % 400 == 0);
    }

    Run | Debug
    public static void main(String[] args) {
        Scanner sacnner = new Scanner(System.in);
        int year;
        String month;
        int daysInMonth;

        //check month
        while (true) {
            System.out.println(x:"Enter a month (ex: January, Jan., Jan, 1): ");
            month = sacnner.nextLine().toLowerCase();
            if(isValidMonth(month)) {
                break;
            } else {
                System.out.println(x:"Invalid month, please try again");
            }
        }

        //check year
        while (true) {
            System.out.println(x:"Enter a year (must have 4 digits): ");
            String yearStr = sacnner.nextLine();
            if (isValidYear(yearStr)) {
                year = Integer.parseInt(yearStr);
                break;
            } else {
                System.out.println(x:"Invalid year, please try again");
            }
        }

        daysInMonth = getDayInMonth(month, year);
        System.out.println("The number of days in " + month + "/" + year + " is: " + daysInMonth);

        sacnner.close();
    }
}
```

Kết quả:

```
Enter a month (ex: January, Jan., Jan, 1):
10
Enter a year (must have 4 digits):
2004
The number of days in 10/2004 is: 31
```

```
Enter a month (ex: January, Jan., Jan, 1):
feb
Enter a year (must have 4 digits):
2020
The number of days in feb/2020 is: 29
```

```
Enter a month (ex: January, Jan., Jan, 1):
March
Enter a year (must have 4 digits):
2024
The number of days in march/2024 is: 31
```

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

```java
package lab01;

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

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

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

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

        Arrays.sort(arr);

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

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

        scanner.close();
    }
}
```

Kết quả:

```
Please enter size of array: 5
Enter element 1: 28
Enter element 2: 10
Enter element 3: 2004
Enter element 4: 19
Enter element 5: 5
Your array is: [28, 10, 2004, 19, 5]
Your array after sort is: [5, 10, 19, 28, 2004]
Sum is: 2066
Average is: 413.2
```

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

```java
package lab01;

import java.util.Scanner;

public class AddTwoMatrices {
    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("Please enter element: matrix 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("Please enter element: matrix 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 of two matrices is: ");
        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: 1
Please enter the numbers of column: 2
Please enter element: matrix A[1][1]: 1
Please enter element: matrix A[1][2]: 5
Please enter element: matrix B[1][1]: 2
Please enter element: matrix B[1][2]: 6
Sum of two matrices is:
3.0   11.0
```