

LAB I Quadratic Equation

```
import java.util.Scanner;
import static java.lang.Math.sqrt;
import static java.lang.Math.abs;

public class New {
    public static void main(String[] args) {
        Scanner in = new Scanner(System.in);
        System.out.println("Enter co-efficient of a
                           quadratic equation");
        int a = in.nextInt();
        int b = in.nextInt();
        int c = in.nextInt();
        if (a == 0) {
            System.out.println("Invalid Input");
        }
        else {
            int d = b * b - 4 * a * c;
            if (d > 0) {
                System.out.println(" Roots are real");
                float r1 = (float) (-b + sqrt(d)) / (2 * a);
                float r2 = (float) (-b - sqrt(d)) / (2 * a);
                System.out.println(r1);
                System.out.println(r2);
            }
            else if (d < 0) {
                System.out.println(" Roots are imaginary");
                float r1 = (float) -b / (2 * a);
                float r2 = (float) sqrt(abs(a)) / (2 * a);
                System.out.println(r1 + " + i " + r2);
                System.out.println(r1 + " - i " + r2);
            }
            else {
                System.out.println(" Roots are equal");
            }
        }
    }
}
```

Output

```
C:\Users\arbaa\Desktop\CS051>javac New.java

C:\Users\arbaa\Desktop\CS051>java New
Enter the coefficients of the quadratic equation (a, b, c):
1
5
2
The roots of the quadratic equation are: -0.4384471871911697 and -4.561552812808831
Name: Arbaj Wadagera.
USN: 1BM22CS051.

C:\Users\arbaa\Desktop\CS051>java New
Enter the coefficients of the quadratic equation (a, b, c):
1
2
1
The root of the quadratic equation is: -1.0
Name: Arbaj Wadagera.
USN: 1BM22CS051.

C:\Users\arbaa\Desktop\CS051>java New
Enter the coefficients of the quadratic equation (a, b, c):
4
2
2
The quadratic equation has no real solutions.
Name: Arbaj Wadagera.
USN: 1BM22CS051.
```

29/12/23 Develop a Java program to create a class student with members usn, name , an array credits & an array marks. Include methods to accept & display details and a method to calculate SGPA of a student.

```
import java.util.Scanner;  
class student  
{  
    Scanner s = new Scanner(System.in);  
    String usn;  
    String name;  
    int[] credits = new int[8];  
    int[] marks = new int[8];  
    public void enterdet()  
    {  
        System.out.println("Enter your usn");  
        usn = s.nextLine();  
        System.out.println("Enter your name");  
        name = s.nextLine();  
        for (int i = 0; i < 8; i++)  
        {  
            System.out.println("Enter the no. of credits for"  
                +(i+1)+"Subject");  
            credits[i] = s.nextInt();  
            System.out.println("Enter the marks for "+(i+1)+  
                "Subject");  
            marks[i] = s.nextInt();  
        }  
    }  
}
```

```
public void displaydet()
{
    system.out.println(" your usn is :" + usn);
    system.out.println(" your name is :" + name);

    for(i=0; i<8; i++)
    {
        system.out.println("Your entered marks, for subject"
                           +(i+1) + " are: " + marks[i]);
    }
}

public void sgpa()
{
    float g=0;
    for(int j=0; j<8; j++)
    {
        int v;
        v = credits[j] * ((marks[j]/10)+1);
        g = g+v;
    }
    system.out.println(" your sgpa is :" +(g/20));
}

public class main
{
    public static void main (String[] args)
    {
        Student p = new Student();
        p. enterdet();
        p. displaydet();
        p. sgpa();
    }
}
```

Output

```
C:\Users\arbaa\Desktop\CS051>javac Main.java

C:\Users\arbaa\Desktop\CS051>java Main
Enter your USN:
1BM22CS051
Enter your name:
Arbaj
Enter the number of credits for Subject 1:
4
Enter the marks for Subject 1:
87
Enter the number of credits for Subject 2:
4
Enter the marks for Subject 2:
98
Enter the number of credits for Subject 3:
3
Enter the marks for Subject 3:
67
Enter the number of credits for Subject 4:
2
Enter the marks for Subject 4:
67
Enter the number of credits for Subject 5:
1
Enter the marks for Subject 5:
49
Your USN is: 1BM22CS051
Your name is: Arbaj
Your entered marks for Subject 1 are: 87
Your entered marks for Subject 2 are: 98
Your entered marks for Subject 3 are: 67
Your entered marks for Subject 4 are: 67
Your entered marks for Subject 5 are: 49
Your SGPA is: 0.96666664
Name: Arbaj Wadagera.
USN: 1BM22CS051.
```

12/01/24

Q3 Create a class Book which contains '4 members': name, author, price, num-pages.
Include a constructor to set the values for the members.
Include methods to set and get the details of the objects.
Include a `toString()` method that could display the complete details of the book. Develop a java program to create n book objects.

```
import java.util.Scanner;  
class book  
{  
    String name;  
    String author;  
    float price;  
    int num-pages;  
  
    void set-details()  
{  
        Scanner sc = new Scanner(System.in);  
        System.out.println(" enter bookname, author, price,  
        num-pages");  
        name = sc.next();  
        author = sc.next();  
        price = sc.nextFloat();  
        num-pages = sc.nextInt();  
    }  
  
    void get-details()  
{  
        String details = toString();  
        System.out.println(details);  
    }  
}
```

```

public String toString()
{
    return "the book "+name+" was written by "+author+
           " it consists of "+numPages+" pages and costs around
           "+price;
}

public static void main (String [] args)
{
    Scanner scan = new Scanner (System.in);
    System.out.println ("enter no. of books you want to
                        generate");
    int n = scan.nextInt();
    book b [] = new book [n];
    for (int i=0; i<n; i++)
    {
        b [i] = new book ();
        b [i].setDetails ();
    }
    System.out.println ("book details");
    System.out.println ();
    for (int i=0; i<n; i++)
    {
        b [i].getDetails ();
    }
}

```

~~Output~~ C:\Users\arbaa\Desktop\CS051\new>javac Main.java

```

C:\Users\arbaa\Desktop\CS051\new>java Main
Enter the number of books you want to generate:
2
Enter book name, author, price, num-pages:
Violent_killer
Arbaaz
99
140
Enter book name, author, price, num-pages:
Think_Like_Me
Salman_khan
890
70
Book details:
The book 'Violent_killer' written by Arbaaz consists of 140 pages and costs $99.0
The book 'Think_Like_Me' written by Salman_khan consists of 70 pages and costs $890.0
Name: Arbaj Wadagera.
USN: 1BM22CS051.

```

P-4 Develop a Java program to create an abstract class named Shape that contains 2 integers & an empty method named printArea(). Provide 3 classes named Rectangle, Triangle and Circle such that each one of the classes extends the class shape. Each one of the classes contain only the method area of the given shape.

```
import java.util.Scanner;  
abstract class Shape {  
    int a, b;  
    abstract void printArea();  
}  
  
class Rectangle extends Shape {  
    Rectangle(int l, int b)  
    {  
        a=l;  
        b=b;  
    }  
    void printArea()  
    {  
        int area=a*b;  
        System.out.println("Area of rectangle:" + area);  
    }  
}  
  
class Triangle extends Shape {  
    Triangle(int ba, int h)  
    {  
        a=ba;  
        b=h;  
    }  
    void printArea()  
    {  
        double area=0.5*a*b;  
        System.out.println("Area of triangle:" + area);  
    }  
}
```

```

class Circle extends Shape {
    Circle(int r) {
        a=r;
    }
    void printArea() {
        double area=3.14*a*a;
        System.out.println("Area of Circle : "+area);
    }
}

class E {
    public static void main(String[] args) {
        Scanner in = new Scanner(System.in);
        System.out.println("Enter length and breadth of a rectangle : ");
        Rectangle rec=new Rectangle(in.nextInt());
        rec.printArea();
        System.out.println("Enter base & height of a triangle : ");
        Triangle tri=new Triangle(in.nextInt(),
                                   in.nextInt());
        tri.printArea();
        System.out.println("Enter the radius of a circle : ");
        Circle cir=new Circle(in.nextInt());
        cir.printArea();
    }
}

```


 output
 121.57

```
C:\Users\arbaa\Desktop\CS051\new4>javac Main.java

C:\Users\arbaa\Desktop\CS051\new4>java Main
Enter length and width of a rectangle:
20
12
Area of Rectangle: 240
Enter base and height of a triangle:
60
120
Area of Triangle: 3600.0
Enter the radius of a circle:
4
Area of Circle: 50.26548245743669
Name: Arbaj Wadagera.
USN: 1BM22CS051.
```

LAB-5 Bank Class that has savings & current Account.

```
import java.util.Scanner;  
class Account {  
    String customerName;  
    long accno;  
    String accountType;  
    double balance;  
    public Account (String customerName, long accno, String  
                    accountType) {  
        this.customerName = customerName;  
        this.accno = accno;  
        this.accountType = accountType;  
        this.balance = 0.0;  
    }  
    public void displayBalance() {  
        System.out.println ("Account Number : " + accno);  
        System.out.println ("Customer Name : " + customerName);  
        System.out.println ("Balance : $" + balance);  
    }  
}  
class CurAcct extends Account {  
    double minBalance;  
    double serviceCharge;  
    public CurAcct (String customerName, long accno)  
    {  
        super (customerName, accno, "current");  
        this.minBalance = 500.0;  
        this.serviceCharge = 50.0;  
    }  
    public void withdraw (double amount)  
    {  
        if (balance - amount >= minBalance)  
        {  
            balance -= amount;  
        }  
    }  
}
```

```
System.out.println("withdrawal successful. Current  
Balance: $" + balance);  
} else {  
    System.out.println("Insufficient funds.  
withdrawal not allowed.");  
}  
}  
}  
public void imposeServiceCharge() {  
    if (balance < minBalance) {  
        balance -= serviceCharge;  
        System.out.println("Service charge imposed.  
Current Balance: RS." + balance);  
    }  
}  
  
class SavAcct extends Account {  
    double interestRate;  
    public SavAcct(String customerName, long  
        accno) {  
        super(customerName, accno, "Savings");  
        this.interestRate = 0.05;  
    }  
    public void depositInterest() {  
        double interest = balance * interestRate;  
        balance += interest;  
        System.out.println("Interest deposited.  
Current Balance: $" + balance);  
    }  
    public void compoundInterest(double  
        initialAmount, int term) {  
        double compoundInterest = initialAmount *  
            Math.pow((1 + interestRate), term) - initialAmount;  
        balance += compoundInterest;  
        System.out.println("Compound interest  
deposited. Current Balance: RS $" + balance);  
    }  
}
```

```
public class Bank{  
    public static void main(String[] args){  
        Scanner scanner = new  
        Scanner(System.in);  
        System.out.println("choose account type");  
        System.out.println("1. Current");  
        System.out.println("2. Savings");  
        System.out.println("Enter choice (1 or 2):");  
        int choice = scanner.nextInt();  
        System.out.println("Enter customer name:");  
        String customerName = scanner.next();  
        System.out.println("Enter account number:");  
        long accno = scanner.nextLong();  
        if (choice == 1){  
            CurAcct curAccount = new  
            CurAcct(customerName, accno);  
            System.out.println("Enter initial balance:  
$");  
            double interestRate = scanner.nextDouble();  
            curAccount.setInterestRate(interestRate);  
            curAccount.displayBalance();  
            double initialBalance = scanner.nextDouble();  
            curAccount.balance = initialBalance;  
            System.out.println("Enter withdrawal  
amount: $");  
            double withdrawAmount = scanner.nextDouble();
```

```
currAccount.withdraw ( withdrawalAmount );
currAccount.imposeServiceCharge();
currAccount.displayBalance();

3 else if (choice == 2) {
    SavAcc savAccount = new SavAcc (customerName,
                                    accno);
    System.out.println ("Enter initial balance: $");
    double initialBalance = scanner.nextDouble();
    savAccount.balance = initialBalance;
    System.out.println ("Enter withdrawal amount: $");
    double withdrawalAmount = scanner.nextDouble();
    savAccount.balance -= withdrawalAmount;
    System.out.println ("Withdrawal successful.");
    System.out.println ("Current balance: $" + savAccount.balance);
    System.out.println ("Enter interest rate:");
    double interestRate = scanner.nextDouble();
    savAccount.interestRate = interestRate;
    savAccount.displayBalance();
    System.out.println ("Enter term (in years)");
    for compound interest calculation:
    int term = scanner.nextInt();
    savAccount.compoundInterest (initialBalance,
                                 term);
    savAccount.displayBalance();
3 else {
    System.out.println ("Invalid choice!");
3
3
```

Output

```
C:\Users\arbaa\Desktop\CS051\new5>javac Main.java

C:\Users\arbaa\Desktop\CS051\new5>java Main
Enter account type (1. Current, 2. Savings):
2
Enter customer name:
Arbaj
Enter account number:
63310100024650
Enter initial balance:
47036
Enter withdrawal amount:
3078
Withdrawal successful. Current Balance: $43958.0
Enter interest rate:
5
Interest deposited. Current Balance: $46155.9
Account Number: 63310100024650
Customer Name: Arbaj
Balance: $46155.9
Name: Arbaj Wadagera.
USN: 1BM22CS051.
```

extra prog.

```
public class Cart {  
    private String itemName;  
    private int price;  
    private int quantity;  
  
    public void setItemName( String itemName )  
    {  
        this.itemName = itemName;  
    }  
  
    public String getItemName()  
    {  
        return itemName;  
    }  
  
    public void setPrice( int price )  
    {  
        this.price = price;  
    }  
  
    public int getPrice()  
    {  
        return price;  
    }  
  
    public static void main( String[] args )  
    {  
        Cart obj = new Cart();  
        obj.setItemName("Butter");  
        obj.setPrice(50);  
        System.out.println("The details we have set are:");  
        System.out.println(obj.getItemName());  
        System.out.println(obj.getPrice());  
    }  
}
```

Q Prog-6 Create a package CIE which has two classes - student and Internals. The class Personal has members like usn, name, sem. The class Internals has an array that stores the internal marks scored in five courses of the current semester of the student. Create another package SEE which has the class External which is a derived class of student. This class has an array that stores the SEE marks scored in five courses of the current semester of the student. Import the two packages in a file that declares the final marks of n students in all five courses.

package CIE;

import java.util.*;

public class Student

{

 public int sem;

 public String usn;

 public String name;

 public void accept()

{

 Scanner scan = new Scanner(System.in);

 System.out.println("Enter U, N, S : \n");

 usn = scan.nextLine();

 name = scan.nextLine();

 sem = scan.nextLine();

}

}

package SEE;

import CIE.Student;

public class External extends Student

{

 public int sm[] = new int[5];

}

```
import java.util.*;
import SEE.*;
import CIE.*;
public class FinalMarks
{
    public static void main [String args[])
    {
        int fm[] = new int[5];
        Scanner sc = new Scanner(System.in);
        System.out.println("Enter n:");
        int n = sc.nextInt();
        SEE.Externals s[] = new CIE.Internals[n];
        for (int i=0; i<n; i++)
        {
            st[i] = new SEE.External();
            s[i] = new CIE.Internals();
            System.out.println("Enter im and sm of sub"
                + (i+1));
            s[i].im[i] = sc.nextInt();
            s[i].sm[i] = sc.nextInt();
            st[i].sm[i] = s[i].im[i] + st[i].sm[i];
            fm[i] = st[i].sm[i];
        }
        System.out.println("Final marks of " + st[i].name);
        for (int k=0; k<5; k++)
        {
            System.out.println("course " + (k+1) + "=" + fm[k]);
        }
    }
}
```

Output

```
C:\Users\arbaa\Desktop\CS051>javac FinalMarks.java
C:\Users\arbaa\Desktop\CS051>java FinalMarks
Enter n:
1
Enter details for student 1
Enter USN, Name, and Semester:
051
Arbaj
3
Enter im and sm of subject 1
15
92
Enter im and sm of subject 2
36
93
Enter im and sm of subject 3
39
90
Enter im and sm of subject 4
26
87
Enter im and sm of subject 5
32
86
Final marks of Arbaj
Subject 1 = 107
Subject 2 = 129
Subject 3 = 129
Subject 4 = 113
Subject 5 = 118
Name: Arbaj Wadagera.
USN: 1BM22CS051.
```

Prog Q7 WAP that demonstrates handling of exceptions in inheritance tree. Create a base class called "Father" & derived class called "Son" which extends the base class. In Father class, implement a constructor which takes the age and throws the exception WrongAge() when the input age < 0. In Son class, implement a constructor that takes both Father & son's age & throws an exception if son's age is \geq father's age.

```
import java.util.Scanner  
class WrongAge extends Exception {  
    public WrongAge() {  
        super("Invalid age provided");  
    }  
}  
  
class Father {  
    private int age;  
    public Father(int age) throws WrongAge {  
        if (age < 0) {  
            throw new WrongAge();  
        }  
        this.age = age;  
    }  
}  
  
class Son extends Father {  
    private int sonAge;  
    public Son(int fatherAge, int sonAge) throws WrongAge {  
        if (sonAge  $\geq$  fatherAge) {  
            throw new WrongAge();  
        }  
        this.sonAge = sonAge;  
    }  
    public int getSonAge() {  
        return sonAge;  
    }  
}
```

```

public class Main {
    public static void main (String [] args) {
        System.out.println ("Enter father's age and son's age");
        try {
            Father father = new Father (50);
            System.out.println ("Father's age: " + father.getAge ());
            Son son1 = new Son (50, 30);
            System.out.println ("Son's age: " + son1.getSonAge ());
            Son son2 = new Son (50, 55);
            System.out.println ("Son's age: " + son2.getSonAge ());
        } catch (WrongAge e) {
            System.out.println (e.getMessage ());
        }
    }
}

```

Output

```

C:\Users\arbaa\Desktop\CS051\new7>javac Main.java

C:\Users\arbaa\Desktop\CS051\new7>java Main
Enter father's age: 36
Father's age: 36
Enter son's age: 37
Error: Son's age must be less than Father's age.
Name: Arbaj Wadagera.
USN: 1BM22CS051.

```

~~Program 8~~ WAP which extends 2 threads,
I displaying " MS college of Engineering" for every
10 secs & other displaying "SE" for every 2 seconds.

```
class A extends Thread {  
    public void run() {  
        int i=0;  
        while(i<5) {  
            i++;  
            try {  
                System.out.println(" BMS college of Engi-  
                neering");  
                Thread.sleep(1000);  
            } catch (Exception e) {  
                System.out.println(e.toString());  
            }  
        }  
    }  
}  
  
public class I {  
    public static void main(String[] args) {  
        One t1 = new One();  
        Two t2 = new Two();  
        t1.start();  
        t2.start();  
    }  
}  
  
class B extends Thread {  
    public void run() {  
        int i=0;  
        while(i<5) {  
            i++;  
        }  
    }  
}
```

```
C:\Users\arbaa\Desktop\CS051>javac I.java  
  
C:\Users\arbaa\Desktop\CS051>java I  
Name: Arbaj Wadagera.  
USN: 1BM22CS051.  
BMS College of Engineering  
CSE  
CSE  
CSE  
CSE  
CSE  
BMS College of Engineering  
BMS College of Engineering  
BMS College of Engineering  
BMS College of Engineering
```

Prog 09 WAP that creates a user interface to perform integer divisions. The user enters two no's in the text fields, Num1 and Num2. The division of Num1 & Num2 is displayed in the Result field when the Divide button is clicked. If num1 & num2 were not integer, the prog. would throw a NumberFormatException. If Num2 were zero, the program would throw an ArithmeticException. Display the exception in a message dialog box.

Code

```
import javax.swing.*;
import java.awt.*;
import java.awt.event.*;

class SwingDemo {
    SwingDemo() {
        JFrame jfrm = new JFrame("Divider App");
        jfrm.setSize(275, 150);
        jfrm.setLayout(new FlowLayout());
        jfrm.setDefaultCloseOperation(JFrame.EXIT_ON_CLOSE);

        JLabel jlab = new JLabel("Enter the divider and dividend:");
        JTextField ajtf = new JTextField(8);
        JTextField bjtf = new JTextField(8);

        JButton button = new JButton("calculate");

        JLabel err = new JLabel();
        JLabel alab = new JLabel();
        JLabel blab = new JLabel();
        JLabel anslab = new JLabel();
```

```
jfrm.add( err );
jfrm.add( jlab );
jfrm.add( ajtf );
jfrm.add( bjtf );
jfrm.add( button );
jfrm.add( alab );
jfrm.add( blab );
jfrm.add( anslab );
```

```
ActionListener I = new ActionListener() {
    public void actionPerformed(ActionEvent evt) {
        System.out.println("Action event from a
        text field");
    }
};

ajtf.addActionListener(I);
bjtf.addActionListener(I);

button.addActionListener(new ActionListener() {
    public void actionPerformed(ActionEvent evt) {
        try {
            int a = Integer.parseInt(ajtf.getText());
            int b = Integer.parseInt(bjtf.getText());
            int ans = a/b;
            alab.setText("In A = " + a);
            blab.setText("In B = " + b);
            anslab.setText("In Ans = " + ans);
        } catch (NumberFormatException e) {
            alab.setText(" ");
            blab.setText(" ");
            anslab.setText(" ");
            err.setText("Enter Only Integers!");
        }
    }
});
```

```
catch(ArithmeticException e) {
    alab.setText(" ");
    blab.setText(" ");
    anslab.setText(" ");
    err.setText("B should be Non zero!");
}
};

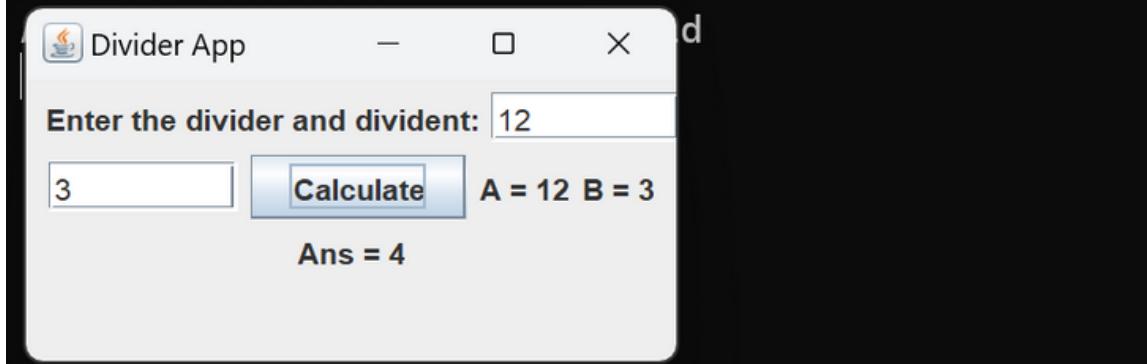
jfram.setVisible(true);
}

public static void main(String args[]) {
    SwingUtilities.invokeLater(new Runnable() {
        public void run() {
            new SwingDemo();
        }
    });
}
```

Output $T_{\text{top}}(i,j)$ to
User

```
C:\Users\arbaa\Desktop\CS051>javac SwingDemo.java
```

```
C:\Users\arbaa\Desktop\CS051>java SwingDemo  
Name: Arbaj Wadagera.  
USN: 1BM22CS051.
```

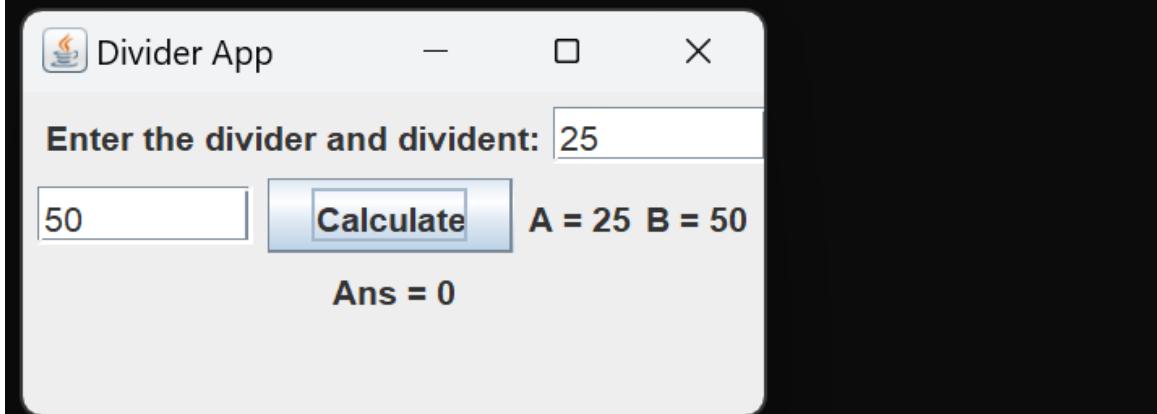


```
C:\Users\arbaa\Desktop\CS051>javac SwingDemo.java
```

```
C:\Users\arbaa\Desktop\CS051>java SwingDemo
```

Name: Arbaj Wadagera.

USN: 1BM22CS051.



```
C:\Users\arbaa\Desktop\CS051>javac SwingDemo.java
```

```
C:\Users\arbaa\Desktop\CS051>java SwingDemo
```

Name: Arbaj Wadagera.

USN: 1BM22CS051.

