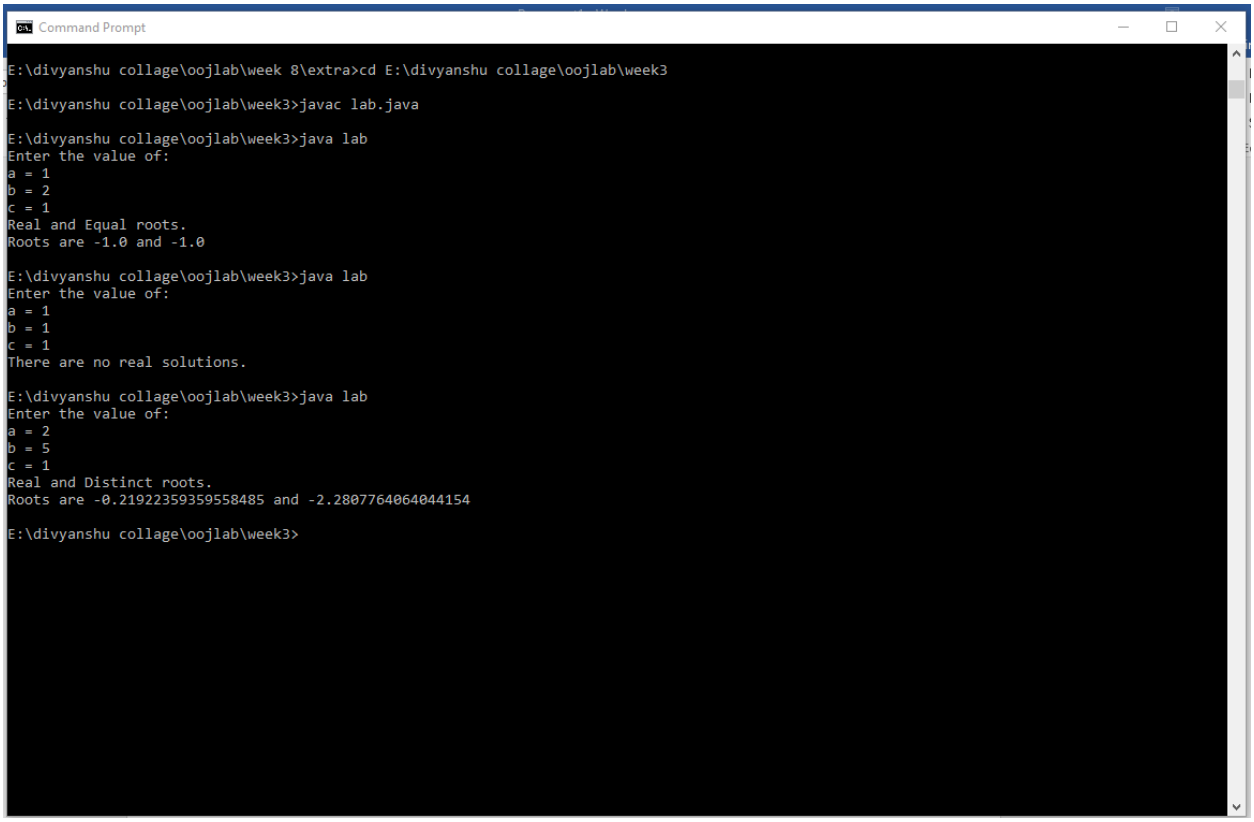
/**********************************lab3**********************************/

Develop a Java program that prints all real solutions to the quadratic equation $ax^2 + bx + c = 0$. Read in a, b, c and use the quadratic formula. If the discriminate $b^2 - 4ac$ is negative, display a message stating that there are no real solutions.

```
import java.util.Scanner;
public class lab {
	public static void main(String[] args) {

		Scanner input = new Scanner(System.in);
		System.out.println("Enter the value of: ");
		System.out.print("a = ");
		double a = input.nextDouble();
		System.out.print("b = ");
		double b = input.nextDouble();
		System.out.print("c = ");
		double c = input.nextDouble();


		double r1,r2;


		double discriminant = b*b - 4*a*c;


		if(discriminant>0) {
			System.out.println("Real and Distinct roots.");
			r1 = (-b + Math.sqrt(discriminant)) / (2 * a);
			r2 = (-b - Math.sqrt(discriminant)) / (2 * a);
```

```
                System.out.println("Roots are " +r1+ " and " +r2);
        }

        else if(discriminant==0) {
                System.out.println("Real and Equal roots.");
                r1 = -b / (2.0 * a);
                r2 = r1;
                System.out.println("Roots are " +r1+ " and " +r2);
        }

        else
                System.out.println("There are no real solutions.");


    }
}
```

Output


Command Prompt
E:\divyanshu collage\oojlab\week 8\extra>cd E:\divyanshu collage\oojlab\week3
E:\divyanshu collage\oojlab\week3>javac lab.java
E:\divyanshu collage\oojlab\week3>java lab
Enter the value of:
a = 1
b = 2
c = 1
Real and Equal roots.
Roots are -1.0 and -1.0
E:\divyanshu collage\oojlab\week3>java lab
Enter the value of:
a = 1
b = 1
c = 1
There are no real solutions.
E:\divyanshu collage\oojlab\week3>java lab
Enter the value of:
a = 2
b = 5
c = 1
Real and Distinct roots.
Roots are -0.21922359359558485 and -2.2807764064044154
E:\divyanshu collage\oojlab\week3>

/**********************************lab4**********************************/

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

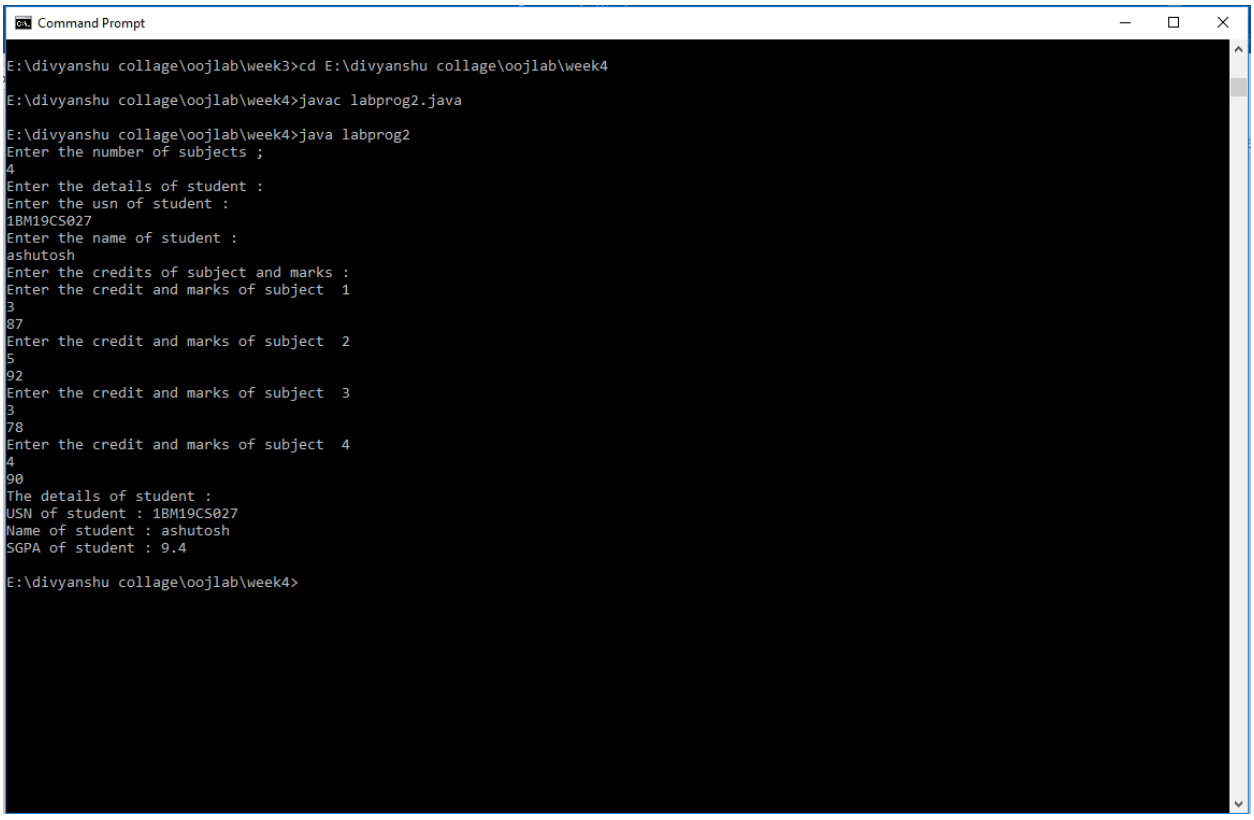
```
import java.util.Scanner;



class Student
{
	private String usn;
	private String name;
	private int credits[];
	private double marks[];
	private int n;
	private double sgpa;
	private double totalcredits;

	void getdata()
	{
		int i;
		Scanner input=new Scanner(System.in);
		System.out.println("Enter the number of subjects ; ");
		n=input.nextInt();
		credits=new int[n];
		marks=new double[n];
		System.out.println("Enter the details of student : ");
		System.out.println("Enter the usn of student : ");
```

```
        usn=input.next();
        input.nextLine();
        System.out.println("Enter the name of student : ");
        name=input.next();
        System.out.println("Enter the credits of subject and marks : ");
        totalcredits=0;
        for(i=0;i<n;i++)
        {
                System.out.print("Enter the credit and marks of subject  ");
                System.out.println(i+1);
                credits[i]=input.nextInt();
                totalcredits=totalcredits+credits[i];
                if(totalcredits>25)
                {
                        System.out.println("Total credits are more than 25 enter again ");
                        totalcredits=totalcredits-credits[i];
                        i--;
                }
                else
                        marks[i]=input.nextDouble();
        }
}
void printdata()
{
        System.out.println("The details of student : ");
        System.out.print("USN of student : ");
        System.out.println(usn);
        System.out.print("Name of student : ");
        System.out.println(name);
```

```
        System.out.print("SGPA of student : ");
        System.out.println(sgpa);
}
void calculate()
{
        int i;
        int x;
        double sum=0,total=0;
        for(i=0;i<n;i++)
        {
                if(marks[i]>=90)
                        x=10;
                else if(marks[i]>=80)
                        x=9;
                else if(marks[i]>=70)
                        x=8;
                else if(marks[i]>=60)
                        x=7;
                else if(marks[i]>=50)
                        x=6;
                else if(marks[i]>=40)
                        x=5;
                else
                        x=0;
                sum=sum + credits[i]*x;
                total=total+credits[i];
        }
        sgpa=sum/total;
}
```

```
}
public class labprog2{
	public static void main(String[] args){
		Student s1=new Student();
		s1.getdata();
		s1.calculate();
		s1.printdata();
	}
}
```

Output



/**********************************lab5**********************************/

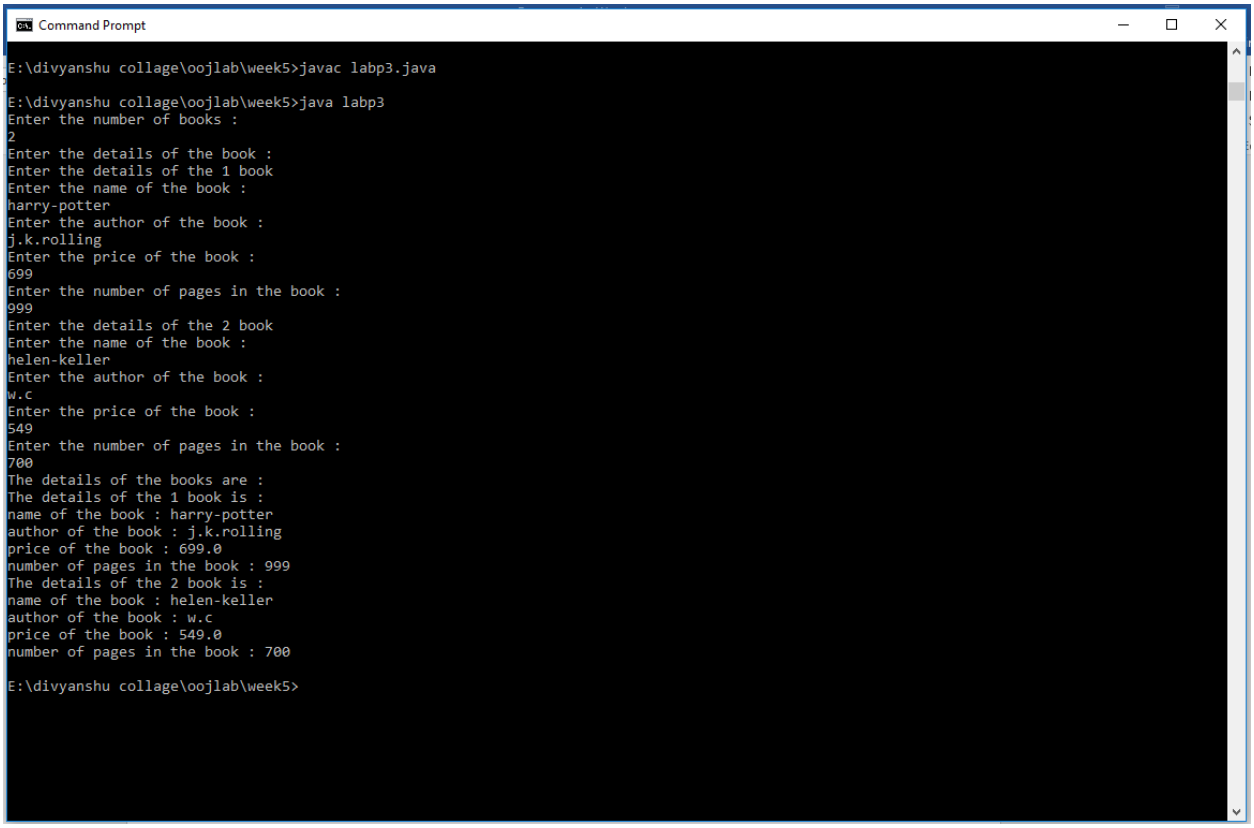
Create a class Book which contains four members: name, author, price, num_pages. Include a constructor to set the values for the members. Include methods to set and get the details of the objects. Include a toString( ) method that could display the complete details of the book. Develop a Java program to create n book objects.

```
import java.util.Scanner;


class Book{
	private String name;
	private String author;
	private double price;
	private int num_pages;

	Book(String s,String a,double p,int n)
	{
		name=s;
		author=a;
		price=p;
		num_pages=n;
	}
	Book()
	{
```

```
        name="NULL";
        author="NULL";
        price=0;
        num_pages=0;
}
void setdata()
{
        Scanner input=new Scanner(System.in);
        System.out.println("Enter the name of the book : ");
        name=input.next();
        input.nextLine();
        System.out.println("Enter the author of the book : ");
        author=input.next();
        input.nextLine();
        System.out.println("Enter the price of the book : ");
        price=input.nextDouble();
        System.out.println("Enter the number of pages in the book : ");
        num_pages=input.nextInt();
}
void getdata()
{
        System.out.println("The name of the book is : "+name);
        System.out.println("The author of the book is : "+author);
        System.out.println("The price of the book is : "+price);
        System.out.println("Number of pages in the book are : "+num_pages);
}

public String toString()
{
```

```
        return("name of the book : "+name+"\nauthor of the book : "+author+"\nprice of the book : "+price+"\nnumber of pages in the book : "+num_pages);
    }
}

public class labp3{
    public static void main(String args[]){
        Scanner xx=new Scanner(System.in);
        System.out.println("Enter the number of books : ");
        int n=xx.nextInt();
        Book b[]=new Book[n];
        int i;
        System.out.println("Enter the details of the book : ");
        for(i=0;i<n;i++)
        {
            System.out.println("Enter the details of the "+(i+1)+" book");
            b[i]=new Book();
            b[i].setdata();
        }
        System.out.println("The details of the books are : ");
        for(i=0;i<n;i++)
        {
            System.out.println("The details of the "+(i+1)+" book is : ");
            System.out.println(b[i]);
        }
    }
}
```

Output


Command Prompt
E:\divyanshu collage\oojlab\week5>javac labp3.java
E:\divyanshu collage\oojlab\week5>java labp3
Enter the number of books :
2
Enter the details of the book :
Enter the details of the 1 book
Enter the name of the book :
harry-potter
Enter the author of the book :
j.k.rolling
Enter the price of the book :
699
Enter the number of pages in the book :
999
Enter the details of the 2 book
Enter the name of the book :
helen-keller
Enter the author of the book :
w.c
Enter the price of the book :
549
Enter the number of pages in the book :
700
The details of the books are :
The details of the 1 book is :
name of the book : harry-potter
author of the book : j.k.rolling
price of the book : 699.0
number of pages in the book : 999
The details of the 2 book is :
name of the book : helen-keller
author of the book : w.c
price of the book : 549.0
number of pages in the book : 700
E:\divyanshu collage\oojlab\week5>

/**********lab8**********/

Develop a Java program to create an abstract class named Shape that contains two integers and an empty method named printArea( ). Provide three 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 printArea( ) that prints the area of the given shape.

Develop a Java program to create a class Bank that maintains two kinds of account for its customers, one called savings account and the other current account. The savings account provides compound interest and withdrawal facilities but no cheque book facility. The current account provides cheque book facility but no interest. Current account holders should also maintain a minimum balance and if the balance falls below this level, a service charge is imposed. Create a class Account that stores customer name, account number and type of account. From this derive the classes Curr-acct and Sav-acct to make them more specific to their requirements. Include the necessary methods in order to achieve the following tasks: • Accept deposit from customer and update the balance. • Display the balance. • Compute and deposit interest • Permit withdrawal and update the balance • Check for the minimum balance, impose penalty if necessary and update the balance

1.

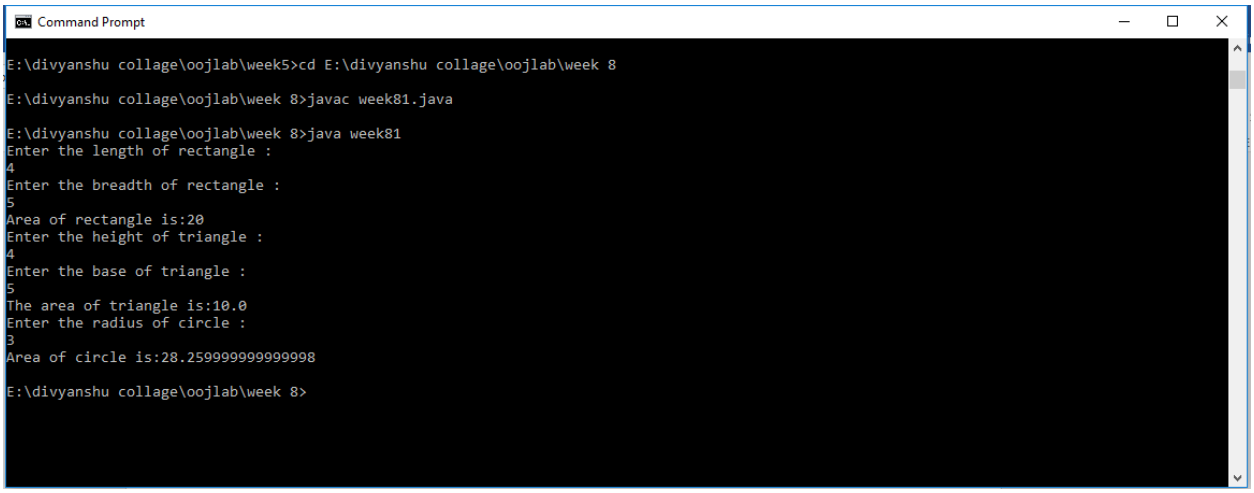
```
import java.util.Scanner;
abstract class shape
{
	private int a,b;
	void setshape(int x,int y)
	{
		a=x;
		b=y;
	}
	int geta()
	{
		return a;
```

```
	}
	int getb()
	{
		return b;
	}
	abstract public void print_area();
}
class rectangle extends shape
{
	private int area_rect;
	rectangle(int x,int y)
	{
		setshape(x,y);
	}
	public void print_area()
	{
		area_rect=geta()*getb();
		System.out.println("Area of rectangle is:"+area_rect);
	}
}
class triangle extends shape
{
	private double area_tri;
	triangle(int x,int y)
	{
		setshape(x,y);
	}
	public void print_area()
	{
```

```
                area_tri=(geta()*getb())/2;
                System.out.println("The area of triangle is:"+area_tri);
        }
}
class circle extends shape
{
        private double area_circle;
        circle(int y)
        {
                setshape(0,y);
        }
        public void print_area()
        {
                area_circle=((3.14)*getb()*getb());
                System.out.println("Area of circle is:"+area_circle);
        }
}
public class week81
{
        public static void main(String[]args){
                Scanner xx=new Scanner(System.in);
                int a,b;
                System.out.println("Enter the length of rectangle : ");
                a=xx.nextInt();
                System.out.println("Enter the breadth of rectangle : ");
                b=xx.nextInt();
                rectangle r= new rectangle(a,b);
                r.print_area();
                System.out.println("Enter the height of triangle : ");
```

```
            a=xx.nextInt();
            System.out.println("Enter the base of triangle : ");
            b=xx.nextInt();
            triangle t= new triangle(a,b);
            t.print_area();
            System.out.println("Enter the radius of circle : ");
            a=xx.nextInt();
            circle c= new circle(a);
            c.print_area();
        }
}
```

Output



2.

```
import java.util.Scanner;
import java.lang.Math;
class Account
{
	private String name;
	private double account_no;
	private char account_type;
	private double balance;

	void getdata(char ch)
	{
		Scanner xx=new Scanner(System.in);
		System.out.print("Enter the name of the customer : ");
```

```
        name=xx.next();
        xx.nextLine();
        System.out.print("Enter the account number of the customer : ");
        account_no=xx.nextDouble();
        System.out.print("Enter the balance of the customer : ");
        balance=xx.nextDouble();
        account_type=ch;

}
void updatebalance(double x)
{
        balance=balance+x;
}
void updatebalance1(double x)
{
        balance=balance-x;
}
void updatebalance2(double x)
{
        balance=x;
}
double getbalance()
{
        return balance;
}
void displaybalance()
{
        System.out.println("The balance is : "+balance);
}
```

```
}

class Saving_Account extends Account{
	private double interest_rate;
	Saving_Account()
	{
		Scanner xx=new Scanner(System.in);
		getdata('S');
		System.out.print("Enter the interest rate : ");
		interest_rate=xx.nextDouble();
	}

	void getdeposit()
	{
		Scanner xx=new Scanner(System.in);
		System.out.print("Enter the amount to be deposited : ");
		double x=xx.nextDouble();
		updatebalance(x);
	}
	void computeinterest()
	{
		Scanner xx=new Scanner(System.in);
		System.out.print("Enter the number of years : ");
		double time=xx.nextDouble();
		double x=(getbalance()*Math.pow((1+((interest_rate)/100)),time));
		updatebalance2(x);
		System.out.println("The computed interest is : "+x);
		displaybalance();
	}
```

```
	void withdrawl()
	{
		System.out.print("Enter the amount to be withdrawn : ");
		Scanner xx=new Scanner(System.in);
		double x=xx.nextDouble();
		while(x>getbalance())
		{
			System.out.println("The amount withdran is more than the balance enter again :
");
			x=xx.nextDouble();
		}
		updatebalance1(x);
		displaybalance();
	}
}

class Current_Account extends Account{
	private double min_balance;
	private int cheque_book;
	Current_Account()
	{
		Scanner xx=new Scanner(System.in);
		getdata('C');
		System.out.print("Enter the minimum balance : ");
		min_balance=xx.nextDouble();
	}

	void getdeposit()
	{
```

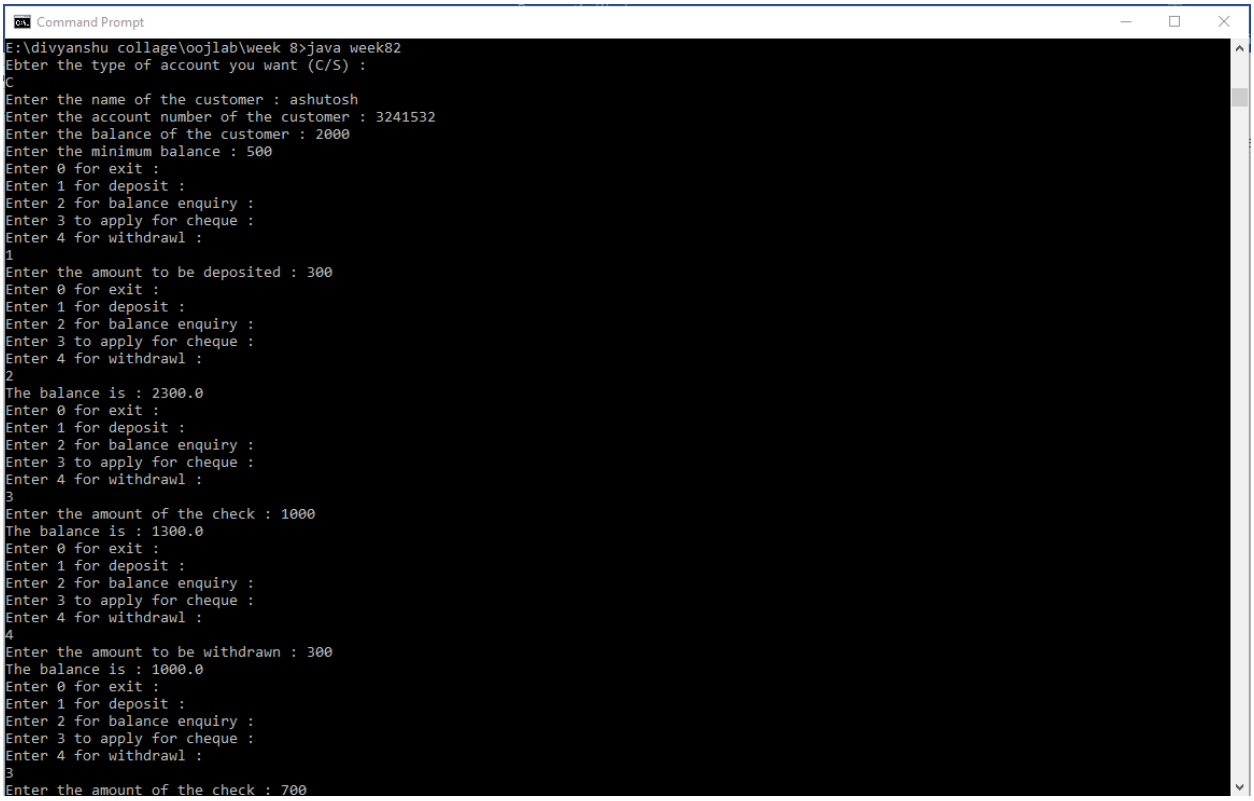
```
		Scanner xx=new Scanner(System.in);
		System.out.print("Enter the amount to be deposited : ");
		double x=xx.nextDouble();
		updatebalance(x);
	}
	void issuecheck()
	{
		Scanner xx=new Scanner(System.in);
		System.out.print("Enter the amount of the check : ");
		double x=xx.nextDouble();
		if(x>(getbalance()-min_balance))
		{
			System.out.println("You have issued check of more than the minmum balance and you have been charged the penalty of 100 rupees");
			updatebalance1(100);
		}
		else
		{
			updatebalance1(x);
		}
		displaybalance();
	}
	void withdrawl()
	{
		System.out.print("Enter the amount to be withdrawn : ");
		Scanner xx=new Scanner(System.in);
		double x=xx.nextDouble();
		while(x>(getbalance()-min_balance))
		{
```

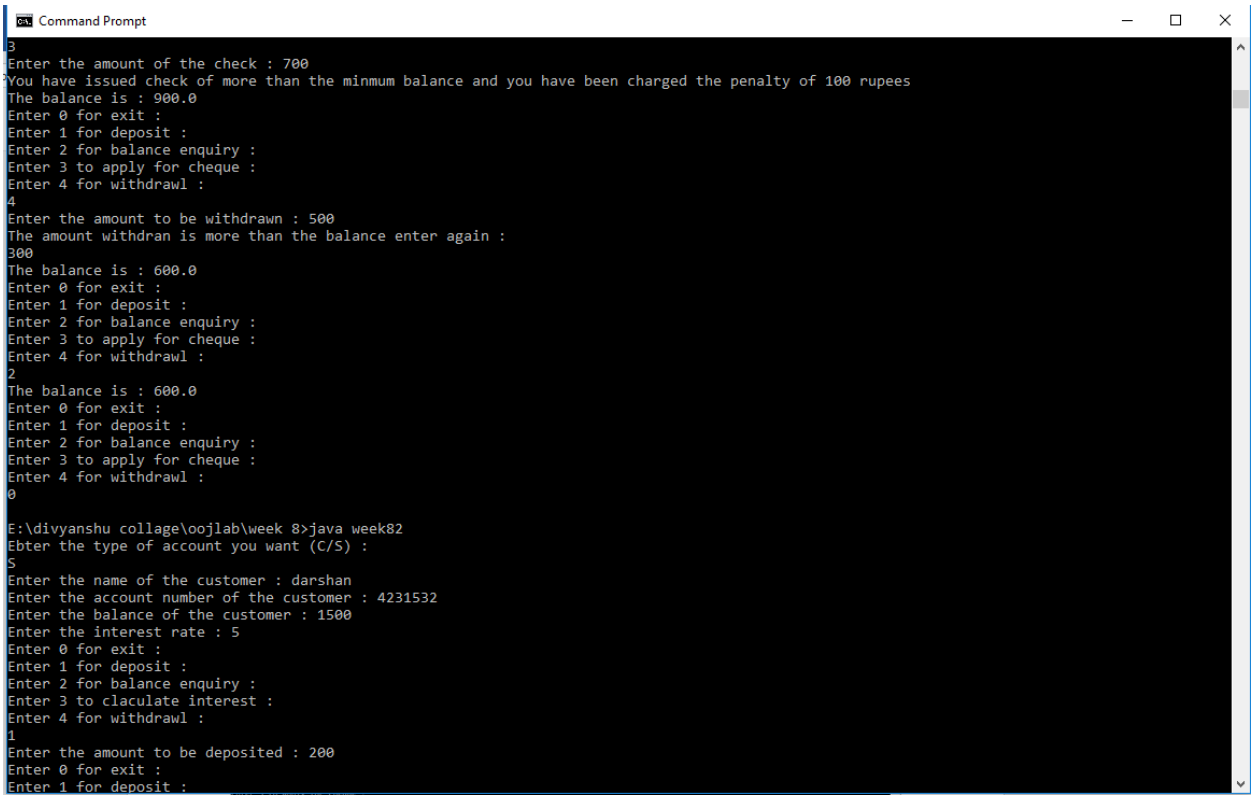
```
                        System.out.println("The amount withdran is more than the balance enter again :
");
                        x=xx.nextDouble();
                }
                updatebalance1(x);
                displaybalance();
        }
}

public class week82{
        public static void main(String args[])
        {
                Scanner input=new Scanner(System.in);
                char ch;
                System.out.println("Ebter the type of account you want (C/S) : ");
                ch=input.next().charAt(0);
                if(ch=='S'||ch=='s')
                {
                        Saving_Account s=new Saving_Account();
                        int x=1;
                        while(x!=0)
                        {
                                System.out.println("Enter 0 for exit : ");
                                System.out.println("Enter 1 for deposit : ");
                                System.out.println("Enter 2 for balance enquiry : ");
                                System.out.println("Enter 3 to claculate interest : ");
                                System.out.println("Enter 4 for withdrawl : ");
                                x=input.nextInt();
                                if(x==0)
```

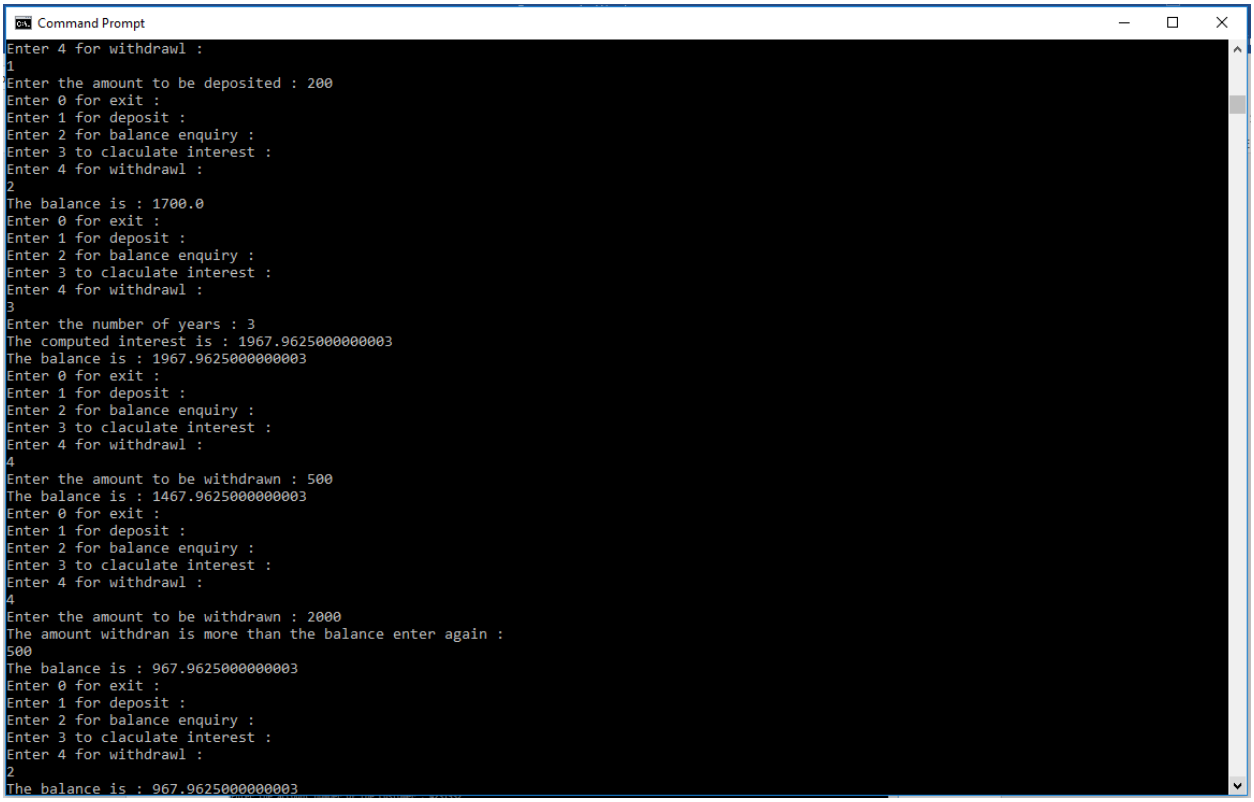
```
                                        break;
                        else if(x==1)
                        {
                                s.getdeposit();
                        }
                        else if(x==2)
                        {
                                s.displaybalance();
                        }
                        else if(x==3)
                        {
                                s.computeinterest();
                        }
                        else if(x==4)
                        {
                                s.withdrawl();
                        }

                }
        }
        else
        {
                Current_Account s=new Current_Account();
                int x=1;
                while(x!=0)
                {
                        System.out.println("Enter 0 for exit : ");
                        System.out.println("Enter 1 for deposit : ");
                        System.out.println("Enter 2 for balance enquiry : ");
```

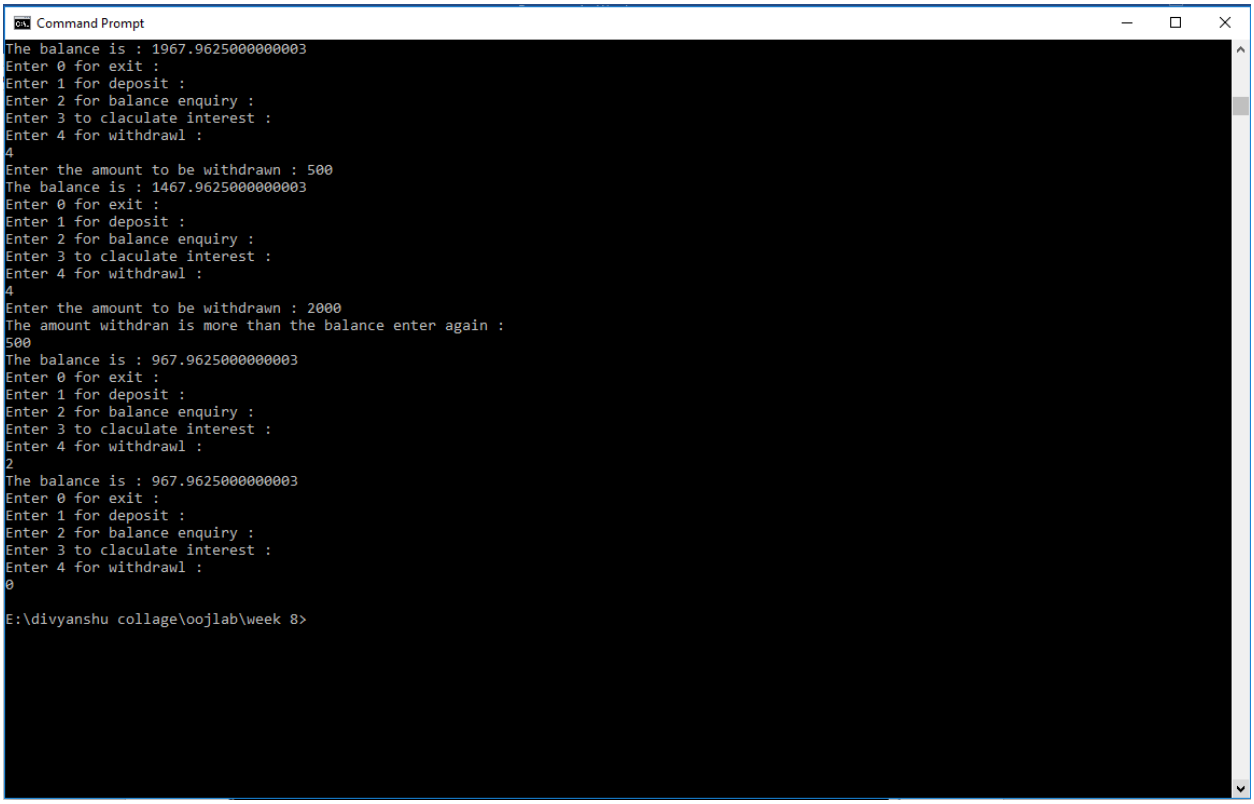
```
                    System.out.println("Enter 3 to apply for cheque : ");
                    System.out.println("Enter 4 for withdrawl : ");
                    x=input.nextInt();
                    if(x==0)
                                break;
                    else if(x==1)
                    {
                        s.getdeposit();
                    }
                    else if(x==2)
                    {
                        s.displaybalance();
                    }
                    else if(x==3)
                    {
                        s.issuecheck();
                    }
                    else if(x==4)
                    {
                        s.withdrawl();
                    }

                }
            }
        }
}
```

Output


Command Prompt
E:\divyanshu collage\oojlab\week 8>java week82
Ebter the type of account you want (C/S) :
C
Enter the name of the customer : ashutosh
Enter the account number of the customer : 3241532
Enter the balance of the customer : 2000
Enter the minimum balance : 500
Enter 0 for exit :
Enter 1 for deposit :
Enter 2 for balance enquiry :
Enter 3 to apply for cheque :
Enter 4 for withdrawl :
1
Enter the amount to be deposited : 300
Enter 0 for exit :
Enter 1 for deposit :
Enter 2 for balance enquiry :
Enter 3 to apply for cheque :
Enter 4 for withdrawl :
2
The balance is : 2300.0
Enter 0 for exit :
Enter 1 for deposit :
Enter 2 for balance enquiry :
Enter 3 to apply for cheque :
Enter 4 for withdrawl :
3
Enter the amount of the check : 1000
The balance is : 1300.0
Enter 0 for exit :
Enter 1 for deposit :
Enter 2 for balance enquiry :
Enter 3 to apply for cheque :
Enter 4 for withdrawl :
4
Enter the amount to be withdrawn : 300
The balance is : 1000.0
Enter 0 for exit :
Enter 1 for deposit :
Enter 2 for balance enquiry :
Enter 3 to apply for cheque :
Enter 4 for withdrawl :
3
Enter the amount of the check : 700


Command Prompt
3
Enter the amount of the check : 700
You have issued check of more than the minmum balance and you have been charged the penalty of 100 rupees
The balance is : 900.0
Enter 0 for exit :
Enter 1 for deposit :
Enter 2 for balance enquiry :
Enter 3 to apply for cheque :
Enter 4 for withdrawl :
4
Enter the amount to be withdrawn : 500
The amount withdran is more than the balance enter again :
300
The balance is : 600.0
Enter 0 for exit :
Enter 1 for deposit :
Enter 2 for balance enquiry :
Enter 3 to apply for cheque :
Enter 4 for withdrawl :
2
The balance is : 600.0
Enter 0 for exit :
Enter 1 for deposit :
Enter 2 for balance enquiry :
Enter 3 to apply for cheque :
Enter 4 for withdrawl :
0
E:\divyanshu collage\oojlab\week 8>java week82
Ebter the type of account you want (C/S) :
S
Enter the name of the customer : darshan
Enter the account number of the customer : 4231532
Enter the balance of the customer : 1500
Enter the interest rate : 5
Enter 0 for exit :
Enter 1 for deposit :
Enter 2 for balance enquiry :
Enter 3 to claculate interest :
Enter 4 for withdrawl :
1
Enter the amount to be deposited : 200
Enter 0 for exit :
Enter 1 for deposit :


Command Prompt
Enter 4 for withdrawl :
1
Enter the amount to be deposited : 200
Enter 0 for exit :
Enter 1 for deposit :
Enter 2 for balance enquiry :
Enter 3 to claculate interest :
Enter 4 for withdrawl :
2
The balance is : 1700.0
Enter 0 for exit :
Enter 1 for deposit :
Enter 2 for balance enquiry :
Enter 3 to claculate interest :
Enter 4 for withdrawl :
3
Enter the number of years : 3
The computed interest is : 1967.9625000000003
The balance is : 1967.9625000000003
Enter 0 for exit :
Enter 1 for deposit :
Enter 2 for balance enquiry :
Enter 3 to claculate interest :
Enter 4 for withdrawl :
4
Enter the amount to be withdrawn : 500
The balance is : 1467.9625000000003
Enter 0 for exit :
Enter 1 for deposit :
Enter 2 for balance enquiry :
Enter 3 to claculate interest :
Enter 4 for withdrawl :
4
Enter the amount to be withdrawn : 2000
The amount withdran is more than the balance enter again :
500
The balance is : 967.9625000000003
Enter 0 for exit :
Enter 1 for deposit :
Enter 2 for balance enquiry :
Enter 3 to claculate interest :
Enter 4 for withdrawl :
2
The balance is : 967.9625000000003


Command Prompt
The balance is : 1967.9625000000003
Enter 0 for exit :
Enter 1 for deposit :
Enter 2 for balance enquiry :
Enter 3 to claculate interest :
Enter 4 for withdrawl :
4
Enter the amount to be withdrawn : 500
The balance is : 1467.9625000000003
Enter 0 for exit :
Enter 1 for deposit :
Enter 2 for balance enquiry :
Enter 3 to claculate interest :
Enter 4 for withdrawl :
4
Enter the amount to be withdrawn : 2000
The amount withdran is more than the balance enter again :
500
The balance is : 967.9625000000003
Enter 0 for exit :
Enter 1 for deposit :
Enter 2 for balance enquiry :
Enter 3 to claculate interest :
Enter 4 for withdrawl :
2
The balance is : 967.9625000000003
Enter 0 for exit :
Enter 1 for deposit :
Enter 2 for balance enquiry :
Enter 3 to claculate interest :
Enter 4 for withdrawl :
0
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