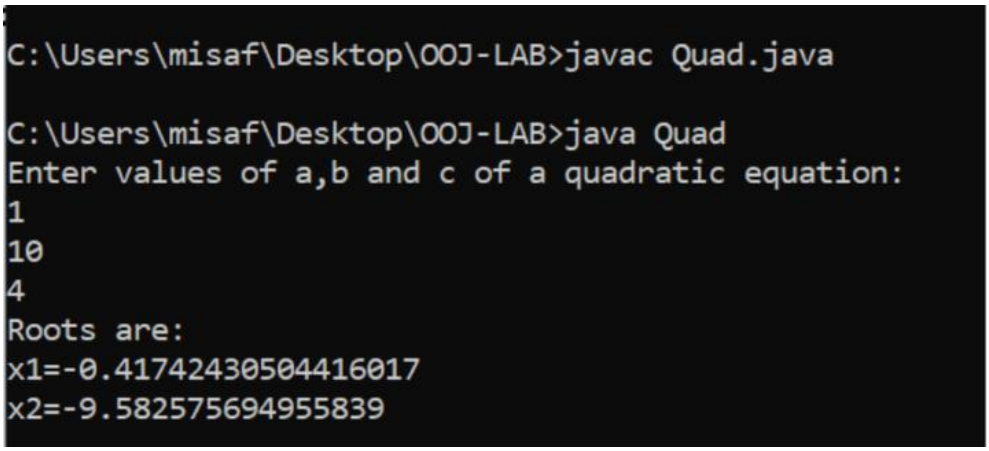
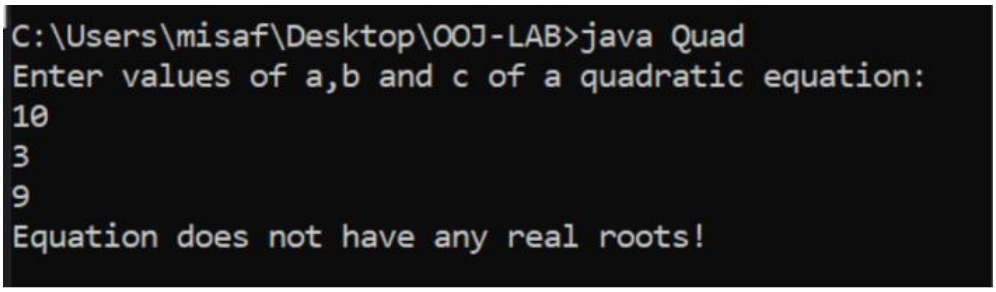
1) Develop a Java program that prints all real solutions to the quadratic equation ax2+bx+c = 0. Read in a, b, c and use the quadratic formula. If the discriminate b2 -4ac is negative, display a message stating that there are no real solutions.

Java program 1 Quadratic equations

```
import java.util.Scanner;
import java.lang.Math;
public class Quad {
    public static void main(String arg[])
    {
        System.out.println("Enter values of a,b and c of a quadratic
                            equation");
        Scanner sc = new Scanner(System.in);
        int a,b,c;
        a = sc.nextInt();
        b = sc.nextInt();
        c = sc.nextInt();
        double d,x1,x2;
        d= b*b - 4*a*c;
        if(d<0)
        { System.out.println("Equation does not have real roots");}
        else
        { x1 = (-b + Math.sqrt(d)) / (2*a);
          x2 = (-b - Math.sqrt(d)) / (2*a);
          System.out.println("Roots are : \nx1 = "+x1+"\nx2 = "+x2);
        }
    }
}
```



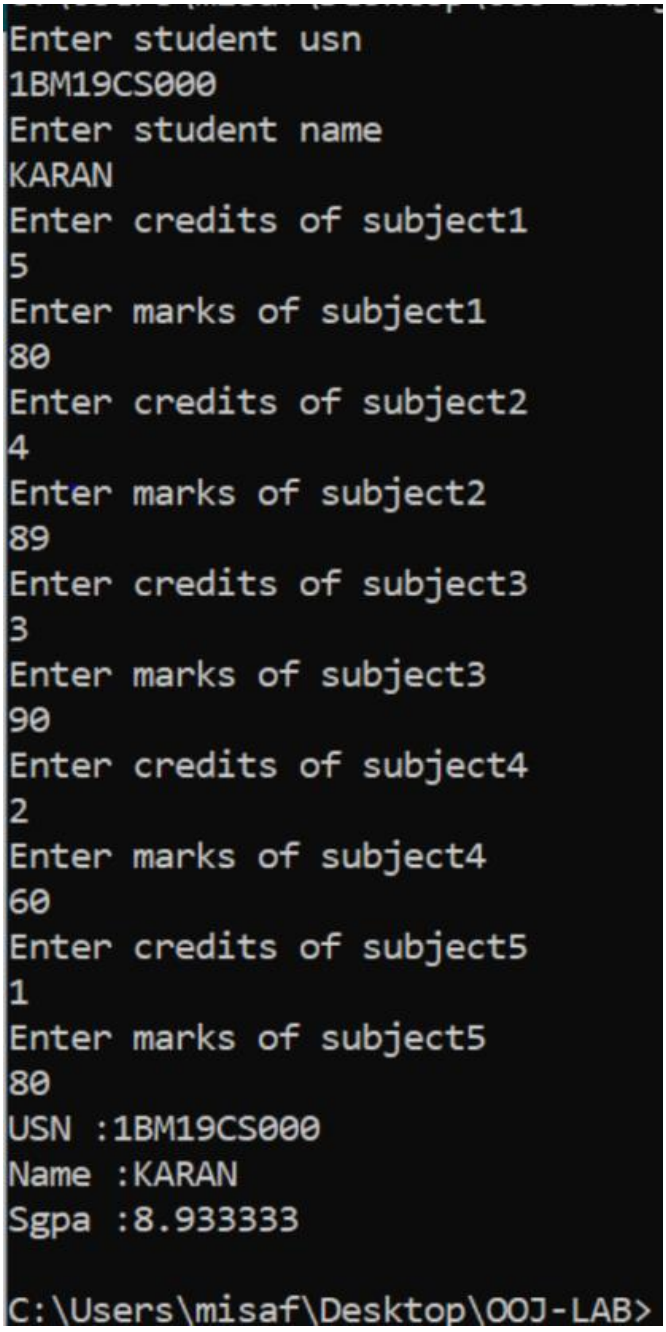


2) Develop a Java program to create a class Student with members usn, name, an array credits and an array marks. Include methods to accept and display details and a method to calculate SGPA of a student.

Java Program 2 Student Class :

```
import java.util.Scanner;
class Student
{   private String usn;
    private String name;
    private int[] credits = new int[5]
    private int[] marks = new int[5]
    void getData()
    {   Scanner sc = new Scanner(System.in);
        System.out.println("Enter student usn");
        usn = sc.next()
        System.out.println("Enter name:");
        name = sc.next()
        int i;
        for(i=0; i<5; i++)
        { System.out.println("Enter credit of sub"+(i+1));
          credits[i] = sc.nextInt();
          System.out.println("Enter marks"+(i+1));
          mark[i] = sc.nextInt();
        }
    }
    float calculate()
    {   int i=0, gpa;
        float tcd=0, td=0;
        for(i=0; i<5; i++)
        {   if(marks[i]>=90)
                gpa=10;
            else if(marks[i]>=80)
                gpa=9;
            else if(marks[i]>=70)
                gpa=8;
            else if(marks[i]>=60)
                gpa=7
            else if(marks[i]>=50)
                gpa=6
```

```
            else
              gpa = 3;
            total = total + credits[i] * gpa;
            td = td + credits[i];
          }
          return (total/td);
      }
      void display()
      { System.out.println("USN: "+usn);
        System.out.println("Name: "+name);
        System.out.println("SGPA: "+calculate());
      }
}
public class StudentMain
{
      public static void main(String args[])
      {
        Student s = new Student();
        s.getData();
        s.display();
      }
}
```



3) 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

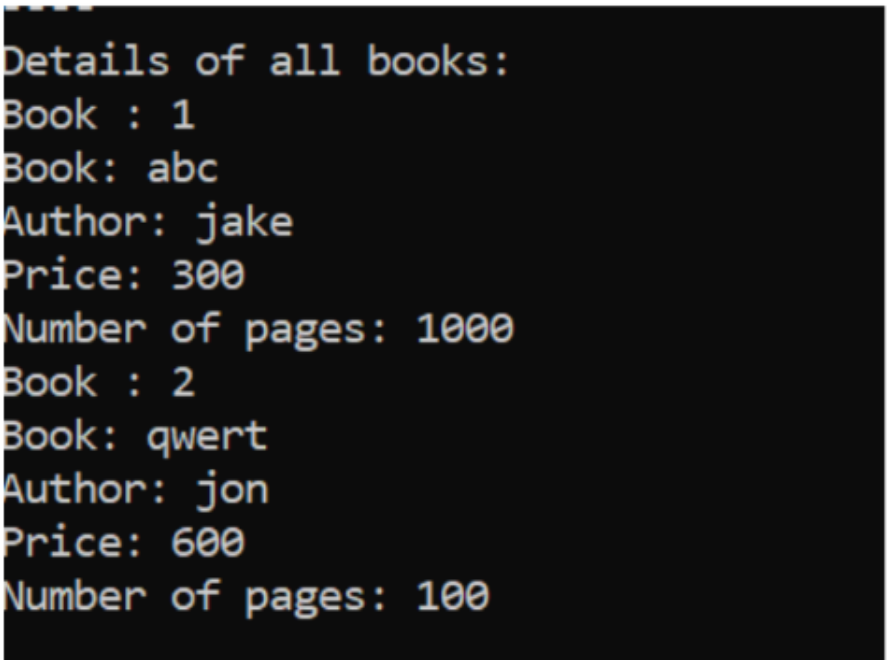
display the complete details of the book. Develop a Java program to create n book objects.

Book Class:

```
import java.util.Scanner;
class Book
{   String name;
    String author;
    String price;
    String num_pages;
    public Book(){
        name : "abc";
        author : "xyz";
        price = "100rs";
        numpages = "500";
        }
    void getData()
{   Scanner sl = new Scanner(System.in);
    System.out.println("Enter Book name : ");
    name = sl.next();
    System.out.println("Enter author name : ");
    author = sl.next();
    System.out.println("Enter price : ");
    price = sl.next();
    System.out.println("Enter pages: ");
    num_pages = sl.next();
}
public String toString() {
    return("Book "+name+"\n Author : "+author+"\nPrice : "+price+"\nNumber
            of pages : "+num_pages);
    }
}
```

```
public class BookMain
{
    public static void main (String args[])
    {
        int i,n;
        Book obj = new Book();
        System.out.println("Constructor values:");
        System.out.println(obj.toString());
        System.out.println("Enter number of books:");
        Scanner s = new Scanner(System.in);
        n = s.nextInt();
        Book[] ob = new Book[n];
        for(i=0; i<n; i++)
        {
            ob[i] = new Book();
            ob[i] = getData();
        }
        System.out.println("Details:");
        for(i=0; i<n; i++)
        {
            System.out.println(ob[i].toString());
        }
}
}
```

```
C:\Users\misaf\Desktop\OOJ-LAB>java BookMain
Constructor values:
Book: abc
Author: xyz
Price: 100rs
Number of pages: 500
Enter number of books:
2
Enter Book name:
abc
Enter Author name:
jake
Enter Book price:
300
Enter number of pages:
1000
----
Enter Book name:
qwert
Enter Author name:
jon
Enter Book price:
600
Enter number of pages:
100
```



4) 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.

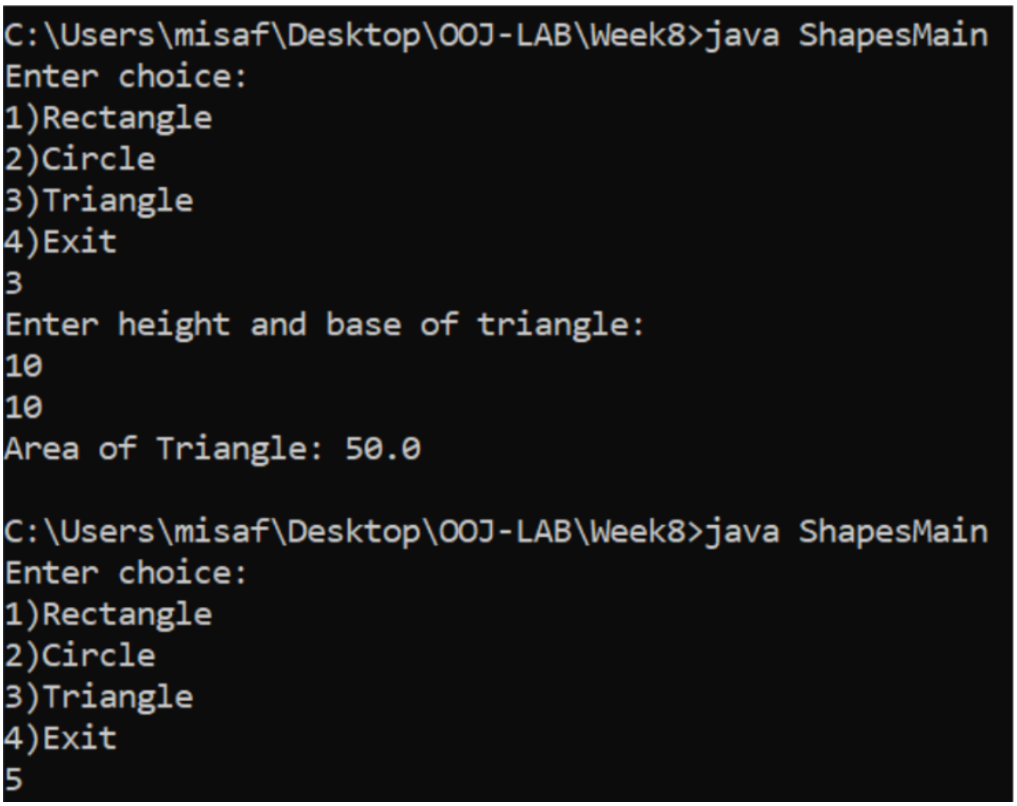
Week 8

Shapes

Code:

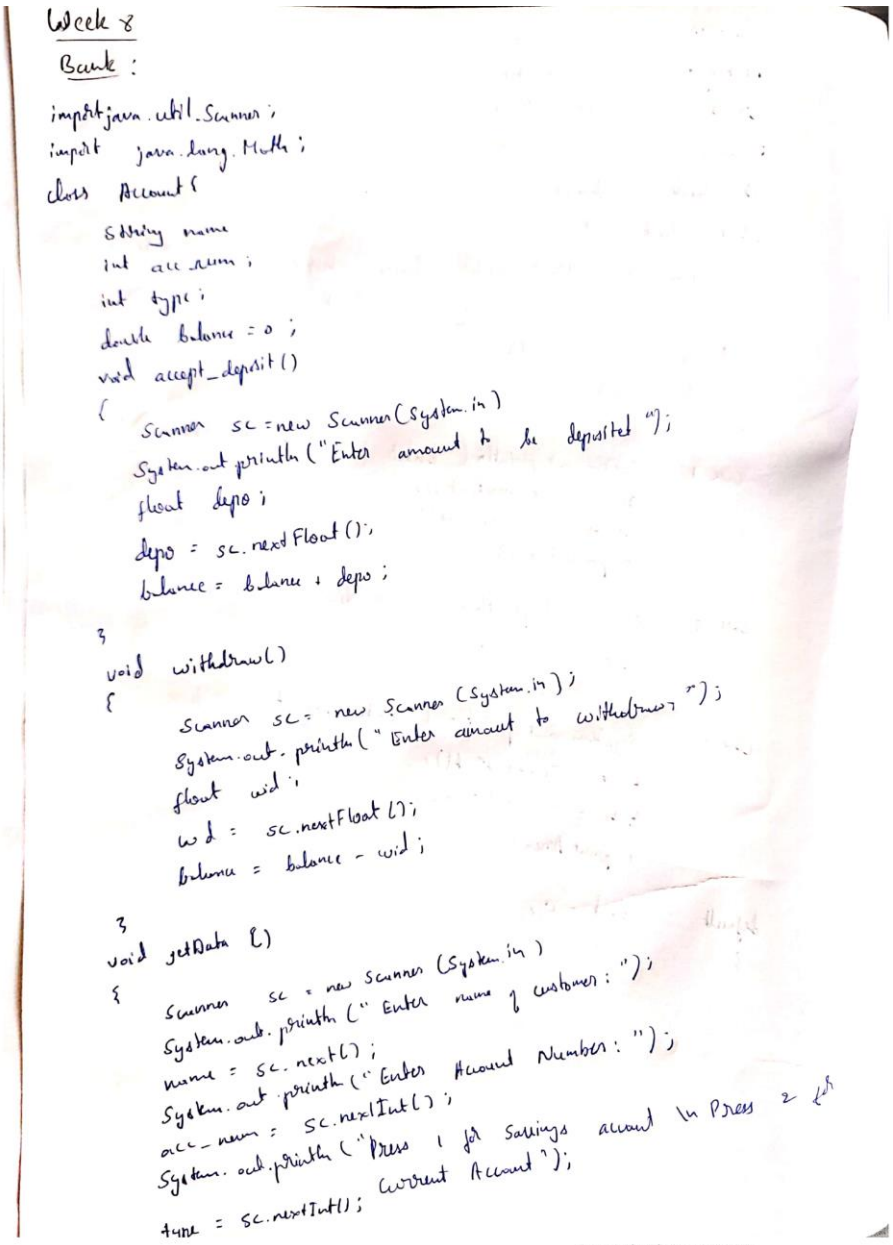
```
import java.util.Scanner;
abstract class Shapes {
    int a;
    int b;
    abstract void printArea();
}
class Rectangle extends Shapes {
    void printArea()
    {
        System.out.println("Area of Rectangle: "+a*b);
    }
}
class Circle extends Shapes {
    void printArea()
    {
        System.out.println("Area of Circle : "+3.14*a*a);
    }
}
class Triangle extends Shapes {
    void printArea()
    {
        System.out.println("Area of Triangle : "+0.5*a*b);
    }
}
public class ShapesMain {
    public static void main(String args[])
    {
```

```
Scanner sc = new Scanner(System.in);
Rectangle r = new Rectangle();
Circle c = new Circle();
Triangle t = new Triangle();
int check = 1, choice;
while (check == 1)
{ System.out.println("Enter choice : \n1) Rectangle \n2) Circle \n3)
                    Triangle \n 4) Exit");

  choice = sc.nextInt();
  switch (choice)
  {
  case 1: System.out.println("Enter length & breadth : ");
          r.a = sc.nextInt();
          r.b = sc.nextInt();
          r.printArea();

  case 2: System.out.println("Enter radius of Circle :");
          c.a = sc.nextInt();
          c.printArea();

  case 3: System.out.println("Enter height & base :");
          t.a = sc.nextInt();
          t.b = sc.nextInt();
          t.printArea();

  default : check = 0;
   }

 }

}
```



5) 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.**



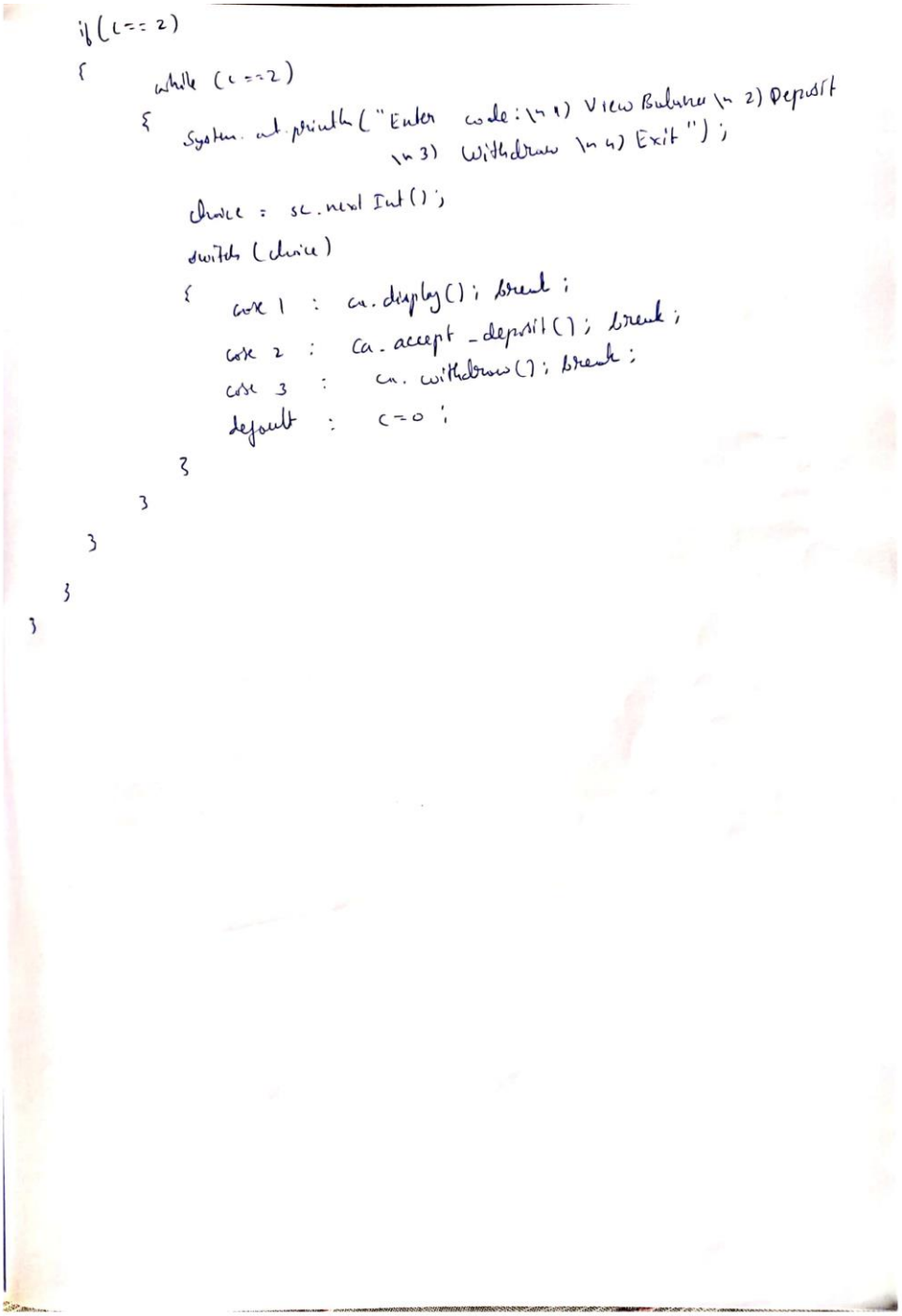
Week 8

Bank :

```
import java.util.Scanner;
import java.lang.Math;
class Account {
    String name;
    int acc_num;
    int type;
    double balance = 0;
    void accept_deposit()
    {
        Scanner sc = new Scanner(System.in);
        System.out.println("Enter amount to be deposited");
        float depo;
        depo = sc.nextFloat();
        balance = balance + depo;
    }
    void withdraw()
    {
        Scanner sc = new Scanner(System.in);
        System.out.println("Enter amount to withdraw");
        float wid;
        wid = sc.nextFloat();
        balance = balance - wid;
    }
    void getData()
    {
        Scanner sc = new Scanner(System.in);
        System.out.println("Enter name of customer:");
        name = sc.next();
        System.out.println("Enter Account Number:");
        acc_num = sc.nextInt();
        System.out.println("Press 1 for savings account & Press 2 for
        type = sc.nextInt(); Current Account");
```

```
class Savings_acc extends Account {
    void calc_ci (float t)
    {   double r = 0.05;
        int n = 12;
        double temp = balance;
        balance = balance * Math.pow((1+r/n), n*t);
        System.out.println ("CI added: " + (balance - temp));
    }
    void display()
    {   System.out.println ("Balance : " + balance);
    }
}
class Curr_acc extends Account{
    void calc_penalty()
    {   balance = balance - 500; }
    void display()
    {   if (balance > 5000)
        {   System.out.println ("Balance : " + balance); }
        else
        {
            System.out.println ("Your account does not have minimum
balance of Rs 5000, hence penalty Rs 500 is being charged");
            calc_penalty();
            System.out.println ("Balance : " +balance);
        }
    }
}
public class Bank{
    public static void main (String args[])
    {
```

```
Scanner sc = new Scanner(System.in);
Account a = new Account();
Curr_acc ca = new Curr_ac();
Savings_acc s = new Savings_acc();
a.getData();
int c, choice;
float t;
c = a.type;
if(c==1)
{
    while(c==1)
    {
        System.out.println("Enter code of your choice of action
        :\n1) View Balance 2) Deposit Amount \n3) Withdraw
        \n4) Exit");
        choice = sc.nextInt();
        switch(choice)
        {
          case 1: System.out.println("Enter the number of years
                  after which balance is being checked:");
                  t = sc.nextFloat();
                  s.calc_ci(t);
                  s.display();
                  break;
          case 2: s.accept_deposit(); break;
          case 3: s.withdraw(); break;
          default: c=0;
        }
    }
}
```

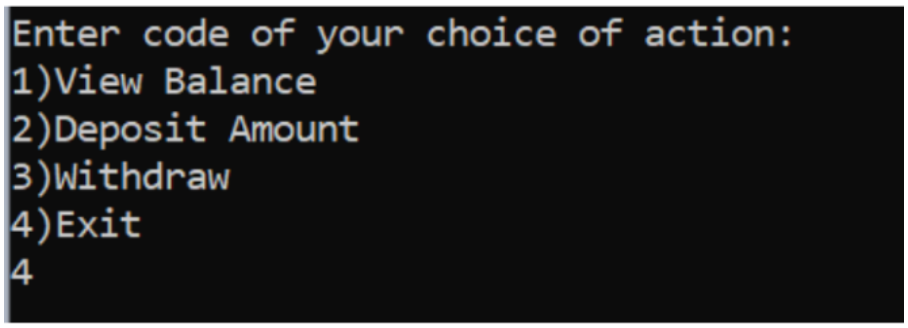


```
if(c==2)
{
    while (c==2)
    {
        System.out.println("Enter code: \n 1) View Balance \n 2) Deposit
                            \n 3) Withdraw \n 4) Exit");

        choice = sc.nextInt();
        switch (choice)
        {
            case 1 : ca.display(); break;
            case 2 : ca.accept_deposit(); break;
            case 3 : ca.withdraw(); break;
            default : c=0;
        }
    }
}
}
```

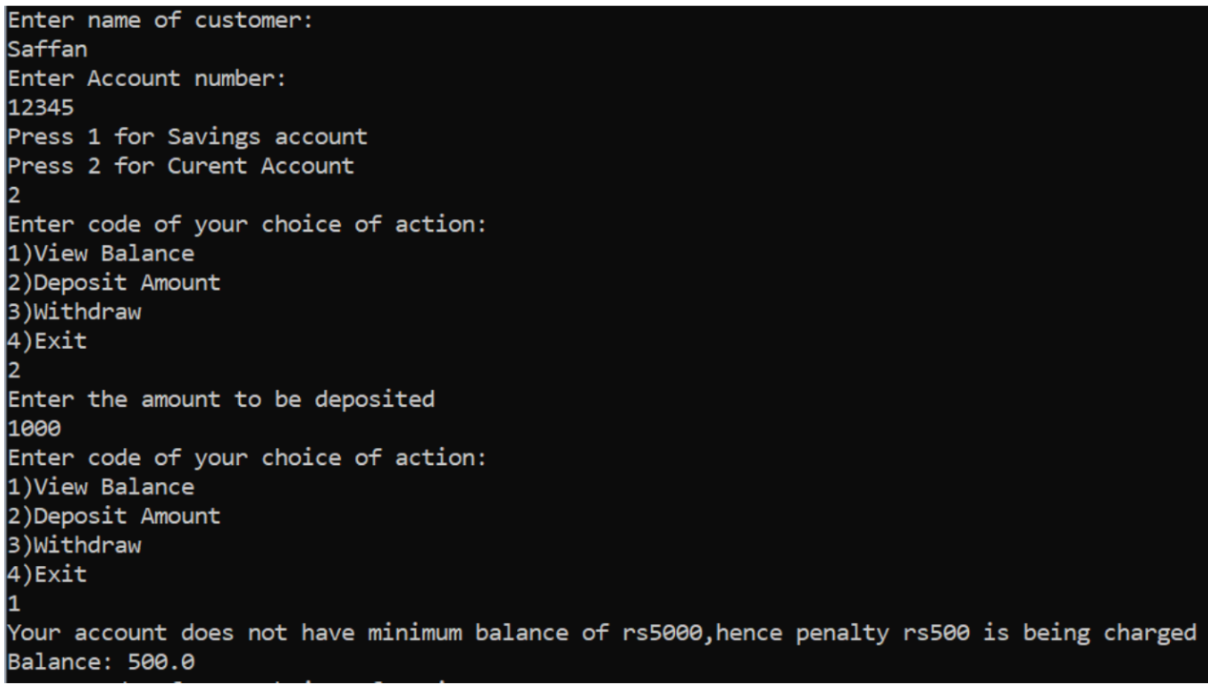

FOR SAVINGS ACCOUNT:

```
Enter name of customer:
Saffan
Enter Account number:
12345
Press 1 for Savings account
Press 2 for Curent Account
1
Enter code of your choice of action:
1)View Balance
2)Deposit Amount
3)Withdraw
4)Exit
1
Enter the number of years after which balance is being checked(to calculate compound interest):
1
CI added:0.0
Balance:0.0
Enter code of your choice of action:
1)View Balance
2)Deposit Amount
3)Withdraw
4)Exit
2
Enter the amount to be deposited
50000
```

```
Enter code of your choice of action:
1)View Balance
2)Deposit Amount
3)Withdraw
4)Exit
1
Enter the number of years after which balance is being checked(to calculate compound interest):
2
CI added:5247.066777916341
Balance:55247.06677791634
Enter code of your choice of action:
1)View Balance
2)Deposit Amount
3)Withdraw
4)Exit
3
Enter the amount to be withdrawn
25000
Enter code of your choice of action:
1)View Balance
2)Deposit Amount
3)Withdraw
4)Exit
1
Enter the number of years after which balance is being checked(to calculate compound interest):
1
CI added:1547.4973417137153
Balance:31794.564119630057
```



FOR CURRENT ACCOUNT:



```
Balance: 500.0
Enter code of your choice of action:
1)View Balance
2)Deposit Amount
3)Withdraw
4)Exit
2
Enter the amount to be deposited
10000
Enter code of your choice of action:
1)View Balance
2)Deposit Amount
3)Withdraw
4)Exit
3
Enter the amount to be withdrawn
3000
Enter code of your choice of action:
1)View Balance
2)Deposit Amount
3)Withdraw
4)Exit
1
Balance: 7500.0
Enter code of your choice of action:
1)View Balance
2)Deposit Amount
3)Withdraw
4)Exit
4
```