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.

```
LAB-1) import java.util.*;
public class lab1 {
    public static void main(String[] args) {
        Scanner sc= new Scanner(System.in);
        double a,b,c,x1,x2,d,m,n;
        System.out.println("Enter the values of
        a,b and c for the quadratic equation
        ax^2 +bx+c:");
        a=sc.nextDouble();
        b=sc.nextDouble();
        c=sc.nextDouble();
        d= b*b-4*a*c;
        if (d>=0)
        {
            x1 = (-b+Math.sqrt(d))/(2*a);
            x2 = (-b-Math.sqrt(d))/(2*a);
            System.out.println(" Roots of the
            equation are:"+x1+" and "+x2);
        }
        else if (d==0){
            x1 = x2 = -(b/(2*a)); System.out.println("Roots of
            equation are "+x1+" and "+x2);
        }
        else {  m=-(b)/(2*a);
            n = Math.sqrt(-d)/(2*a);
            System.out.println(" These are no real
            solutions");
            System.out.println(" Roots of the
            equation are:" +m+ "+" +n+ "i");
            System.out.println("Roots of the
            equation are:" +m+ "-" +n+ "i");
        }
    }
}
```

```
Microsoft Windows [Version 10.0.18362.1082]
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C:\Users\HP-PC>cd Desktop

C:\Users\HP-PC\Desktop>cd JAVA_PROGRAMS

C:\Users\HP-PC\Desktop\JAVA_PROGRAMS>javac lab1.java

C:\Users\HP-PC\Desktop\JAVA_PROGRAMS>java lab1
Enter the values of a,b and c for the quadratic equation ax^2+bx+c:
1
5
6
Roots of the equation are:-2.0 and -3.0

C:\Users\HP-PC\Desktop\JAVA_PROGRAMS>
```

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
1b) import java.util.Scanner;
class Student {
    private String usn;
    private String name;
    private int[] credit = new int[5];
    private double[] marks = new double[5];
    private int n=0;
    private int total_credits=0;
    private float total = 0f;
    private float sgpa = 0f;
    private int[] p = new int[5];
    Scanner s = new Scanner(System.in);

    Student() {
        usn = "";
        name = "";
    }

    Student(String eusn, String ename, double[] emarks,
            int[] credit)
    {
        usn = eusn;
        name = ename;
        marks = emarks;
        credit = ecredit;
    }

    public void get_details()
    {
        System.out.println("Enter the usn of
        student: ");
        usn = s.next();
        System.out.println("Enter the name of
        student:");
        name = s.next();
        System.out.println("Enter the number of
        subjects:");
        n = s.nextInt();
        marks = new double[n];
        credit = new int[n];
        for (int i=0; i<5; i++)
        {
            System.out.println("Enter the marks
            of subject" + (i+1) + "(for 100):");
            marks[i] = s.nextDouble();
            System.out.println("Enter the credits
            for subject" + (i+1) + ":");
            credit[i] = s.nextInt();
        }
    }

    public float compute_sgpa()
    {
        p = new int[n];
        for (int i=0; i<5; i++)
        {
            total_credits += credit[i];
        }
        for (int i=0; i<5; i++)
        {
            if (marks[i] >= 90)
                p[i] = 10;
            else if (marks[i] >= 80)
                p[i] = 9;
            else if (marks[i] >= 70)
                p[i] = 8;
            else if (marks[i] >= 60)
                p[i] = 7;
            else if (marks[i] >= 50)
                p[i] = 6;
            else if (marks[i] >= 40)
                p[i] = 5;
            else
                p[i] = 0;
        }
        for (int i=0; i<5; i++)
        {
            total += p[i] * credit[i];
        }
        sgpa = total / total_credits;
        return sgpa;
    }

    public void display_details()
    {
        sgpa = compute_sgpa();
        System.out.println("Student Details:");
        System.out.println("Student usn :"+usn);
        System.out.println("Student name :"+name);
        System.out.println("Marks   Credits");
        for (int i=0; i<n; i++)
        {
            System.out.println(marks[i]+ "  "+ credit[i]);
        }
        System.out.println("Student sgpa : "+sgpa);
    }
}

public class lab2 {
    public static void main(String[] args)
    {
        double[] marks = {100,100,100,100,100};
        int[] credit = {4,4,4,4,4};
        Student s1 = new Student();
        s1.get_details();
        s1.display_details();
        Student s2 = new Student("1BM19CS004","Adithi",marks,
                                 credit);
        s2.display_details();
    }
}
```

```
"C:\Program Files\Java\jdk1.8.0_261\bin\java.exe" ...
Enter the usn of student:
18M19CS065
Enter the name of student:
Jahnavi
Enter the marks of subject1(for 100):
100
Enter the credits for subject1:
5
Enter the marks of subject2(for 100):
98
Enter the credits for subject2:
3
Enter the marks of subject3(for 100):
99
Enter the credits for subject3:
4
Enter the marks of subject4(for 100):
98
Enter the credits for subject4:
4
Enter the marks of subject5(for 100):
92
Enter the credits for subject5:
4
Student usn:18M19CS065
Student name:Jahnavi
```

```
Student usn:18M19CS065
Student name:Jahnavi
Marks  Credits
100.0 5
98.0 3
99.0 4
98.0 4
92.0 4
Student sgpa:10.0
Student usn:18M19CS004
Student name:Adithi
Marks  Credits
100.0 4
100.0 4
100.0 4
100.0 4
100.0 4
Student sgpa:10.0

Process finished with exit code 0
```

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 objects.

```java
        {
            this.name = n;
            this.author = a;
            this.price = p;
            this.num_pages = np;
        }
        public String toString() {
            return ("Name = " + name + "\n" + "Author = " + author +
            "\n" + "Price = " + price + "\n" + "Number of
            pages = " + num_pages + "\n");
        }
}
public class lab3 {
        public static void main(String args[]) {
            int n;
            Scanner s = new Scanner(System.in);
            System.out.println("Enter the number of
            books:");
            n = s.nextInt();
            Book[] b = new Book[n];
            for(int i=0; i<n; i++) {
                b[i] = new Book();
                b[i].get_details();
            }
            for(int i=0; i<n; i++) {
                System.out.print("Details of the book"
                +(i+1)+":");
                System.out.println(b[i]);
            }
            Book boo1 = new Book();
            boo1.set_details("The story", "Sushma",
            200, 300);
            System.out.println("Details of the book:");
            System.out.println(boo1);
        }
}
```

```
"C:\Program Files\Java\jdk1.8.0_261\bin\java.exe" ...
Enter number of books:
2
Enter the name of the book:
The wings of fire
Enter the author of the book:
APJ Abdul Kalam
Enter the price of the book:
200
Enter the number of pages of the book:
300
Enter the name of the book:
THe boy with a stick
Enter the author of the book:
Sundar
Enter the price of the book:
100
Enter the number of pages of the book:
100

Details of the book1:
Name=The wings of fire
Author=APJ Abdul Kalam
Price=200.0
Number of pages=300

Details of the book2:
Name=THe boy with a stick
```

```
Details of the book1:
Name=The wings of fire
Author=APJ Abdul Kalam
Price=200.0
Number of pages=300

Details of the book2:
Name=THe boy with a stick
Author=Sundar
Price=100.0
Number of pages=200

Details of the book:
Name=The story
Author=Sushma
Price=200.0
Number of pages=300

Process finished with exit code 0
```

```
Details of the book1:
Name=The wings of fire
Author=APJ Abdul Kalam
Price=200.0
Number of pages=300

Details of the book2:
Name=THe boy with a stick
Author=Sundar
Price=100.0
Number of pages=200

Details of the book:
Name=The story
Author=Sushma
Price=200.0
Number of pages=300

Process finished with exit code 0
```

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.

```java
lab4>  import java.util.Scanner;
       abstract class Shape {
            int a, b;
            Shape (a, b):
            Shape (int a, int b) {
                this.a = a;
                this.b = b;
            }
            abstract void printArea();
       }

       class  Rectangle extends Shape {
            Rectangle (int a, int b) {
                super (a, b);
            }

            void printArea() {
                System.out.println ("Area of the rectangle"
                + (a*b));
            }
       }

       class  Triangle extends Shape {
            Triangle (int a, int b) {
                super (a, b);
            }

            void printArea() {
                System.out.println ("Area of the triangle"
                + (a*b) - ((float) a*b) / 2);
            }
       }
```

```java
class Circle1 extends Shape {
     Circle1 extends
     Circle1 (int a, int b) {
         super (a, b)
     }

     void printArea() {
         System.out.println ("Area of the circle"
         (2 * 3.14 * a));
     }
}

public class Week-8-lab-4 {
     public static void main (String [] args) {
         Scanner S=new Scanner (System.in);
         int a, b;
         System.out.println ("Enter the values for
         the integers a and b:");
         a = S.nextInt();
         b = S.nextInt();
         Rectangle x = new Rectangle (a, b);
         Triangle t = new Triangle (a, b);
         Circle1 c = new Circle1 (a, b);
         x.printArea();
         t.printArea();
         c.printArea();
     }
}
```
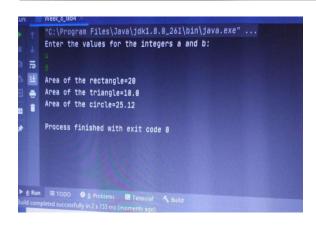
5)Develop a Java program to create a class Bank that maintains two kinds of account for its customers, one called savings account and the other current account. The savings account provides compound interest and withdrawal facilities but no cheque book facility. The current account provides cheque book 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


```java
lab5)    import java.util.*;
         class Account {
             String acc_name;
             int acc_num;
             String cust_name;
             double balance;
             Scanner s = new Scanner(System.in);
             void accept() {
                 System.out.println("Customer name:");
                 cust_name = s.nextLine();
                 System.out.println("Account number:");
                 acc_num = s.nextInt();
                 System.out.println("Balance amount:");
                 balance = s.nextDouble();
             }

             void display() {
                 System.out.println("Customer name "+
                 cust_name);
                 System.out.println("Account  number "+
                 acc_num);
                 System.out.println("Balance amount "+
                 balance);
             }

             void deposit() {
                 int amt;
                 System.out.println("Enter the amount
                 to  be  deposited:");
                 amt = s.nextInt();
                 balance = balance + amt;
             }
         }

         class Savings_acc  extends Account {
             double inter;
             double comp_inter() {
                 int time;
```

```java
                500");
        }
        else {
            System.out.println("No penalty is impo[sed]
        }
    }
    void withdrawal() {
        int amt;
        System.out.println("Enter the amount to be
        withdrawn :");
        amt = s.nextInt();
        if (balance - amt > m_bal) {
            if (balance >= amount)
            {   balance = balance - amt;
            }
            else {
                System.out.println("The amount cannot
                be withdrawn as there is no enough
                amount");
            }
        }
        else {
            System.out.println("The penalty will be "+
            penalty +" if the balance after
            withdrawal is less than the minimum
            balance");
            balance = balance - amt;
            min_bal();
        }
    }
}
public class Bank {
    public static void main(String[] args)
    {   Scanner s = new Scanner(System.in);
        Savings_acc s = new Savings_acc();
```

```java
        int rate = 10;
        System.out.println("Enter the time :");
        time = s.nextInt();
        inter = balance * Math.pow((1+ (double) rate/100, ti
        return index;
    }
    void update_balance() {
        balance = balance + comp_inter();
    }
    void withdrawal() {
        int amount;
        System.out.println("Enter the amount to be
        withdrawn :");
        amount = s.nextInt();
        if (balance >= amount)
        {
            balance = balance - amount;
        }
        else {
            System.out.println("The amount cannot be
            withdrawn as there is no sufficient
            balance");
        }
    }
}
class Current_acc extends Account {
    boolean check_book;
    int penalty = 50;
    double m_bal = 500;
    void min_bal()
    {
        if (balance <= m_bal) {
            balance = balance - penalty;
            System.out.println("Penalty is
            imposed as penalty is less tha[n]
```

```
Current acc = new Current-acc();
System.out.println("Press 1 for savings and 2
for current account");
int ch = sc.nextInt();
if (ch==1){
    s.acc-type ="savings";
    s.accept();
    s.display();
    System.out.println("Type of account:"+
    s.acc-type);
    s.deposit();
    s.display();
    System.out.println("Type of account :"+
    s.acc-type);
    s.update-balance();
    s.display();
    System.out.println("Type of account :"+
    s.acc-type);
    s.withdrawal();
    s.display();
    System.out.println("Type of account :"+
    s.acc-type);
}
else if (ch==2){
    c.acc-type = "current";
    c.accept();
    c.display();
    System.out.println("Type of account:"+
    c.acc-type);
    c.deposit();
    c.display();
    System.out.println("Type of account :"+
    c.acc-type);
    c.withdrawal();
    c.display();
```

```
    System.out.println("Type of account:"+
    c.acc-type);}
else {
    System.out.println("please input a valid
    number");
    }
} }
```