Object Oriented Java Record

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Sem & Section:3 A

LAB Program 1:

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.

Observation:

LAB1 : Roots of Quad-Equation :

```java
import java.util.Scanner;

class Lab1
{
    public static void main (String args[])
    {
        double a,b,c,r1,r2,d,sqrt;
        System.out.println("\n Enter The co-efficients
                of Quadratic Equation (ax^2+bx+c):");
        Scanner get = new Scanner(system.in);

        a = get.nextDouble();
        b = get.nextDouble();
        c = get.nextDouble();

        d = (b*b) - (4*a*c);

        if (d>0)
        {
            System.out.println("\n The Roots are real and
                        distinct :");

            sqrt = Math.sqrt(d);
            r1 = (-b+ sqrt)/(2*a);
            r2 = (-b- sqrt)/(2*a);
            System.out.print("\n They are : Root 1=
                    %0.4f and Root 2 = %0.4f", r1, r2);
        }
        else
        if (d == 0)
        {
            System.out.println("\n The Roots are real
                        and equal :");

            r1 = ((-b)/(2*a));
            r2 = r2;
            System.out.print("\n They a : Root] = %0.4f
```

and   Root 2 = %0.4 ℓ", 82, 82);

}

else
if $(d < 0)$
{
System.out.Println ("\n The Roots are imaginary ! ");
System.out.printe ("\n They are : Root 1 = %0.2ℓ + (%0.2ℓ)(i)

and Root 2 = %0.2ℓ + (%0.2ℓ)(i) ",

$(-b|(2*a))$, $(-Math.sqrt(-d)|(2*a))$,

$(-b|(2*a))$, $(+Math.sqrt(-d)|(2*a)))$;

}

}

Output:

```
Enter The Co-efficients of Quadraric Equation (ax^2+bx+c):
5
-14
3

The Roots are real and distinct:

They are : Root 1= 2.5662 and Root 2= 0.2338
G:\NoTePadPP\MyJava>java lab1

Enter The Co-efficients of Quadraric Equation (ax^2+bx+c):
1
-2
1

The Roots are real and equal:

They are : Root 1= 1.0000 and Root 2= 1.0000
G:\NoTePadPP\MyJava>java lab1

Enter The Co-efficients of Quadraric Equation (ax^2+bx+c):
8
2
4

The Roots are imaginary:

They are : Root 1= -0.13+(-0.70)(i) and Root 2= -0.13+(0.70)(i)
G:\NoTePadPP\MyJava>
```

LAB Program 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.

Observation:

```java
import java.util.scanner;
class student {
    private int n;
    private int credits[];
    private string name,usn;
    private double marks[];
    Scanner get =new Scanner (system.in);
    student ()
    {
        System.out.printf ("\n Enter The Number of course:
        n =get.nextInt();
        marks =new double [n];
        credits =new int [n];
    }

    void getinfo()
    {
        System.out.print (" \n Enter the USN and Name!")
        usn =get.next();
        name =get.next();
        System.out.printf ("\nEnter the Marks(out of 100)
                and credits :");
        for (int i=0;i<n;i++)
        {
            system.out.printf ("\nCourse %d:",i+1);
            marks[i] =get.nextDouble();
            credits [i]= get.nextInt();
        }
    }
}
```

(1)

```java
Int  gpCall (double num)
{
    if (num >= 50)
    return (int)(Math.ceil(num/10));

    else
    if (num >= 40)
    return 4;

    else
     return 0;
}

double  calculation()
{
    double  sgpaSum = 0, sgpa = 0, creditsum = 0;
    for (int i = 0; i < n; i++)
    {
        sgpaSum += gpCal(marks[i]) * credits[i];
        creditSum += credit[i];
    }
    System.out.println("\n\ncredit  Sum:" + creditsum);
    sgpa = sgpaSum / creditsum;
    return sgpa;
}

void  details()
{
    System.out.println("\n The student  Details  Are:");
    System.out.println("\n USN: " + USN + "\n Name: " + name);
    System.out.printf("\n\t");

    for (int i = 0; i < n; i++)
    System.out.printf("  course  -%d     ", i+1);
    System.out.print("\nMarks :     ");
    for (int i = 0; i < n; i++)
    {
```

```java
            System.out.printf ("%0.2f      ",marks(i));
    }

        System.out.println ("\n Credits      ");
        for (int i=0 ; i<n ;i++)
        {
            System.out.printf ("%d \t|t ", credits (i));
        }
    }
}


class Lab2Student
{
    public static void main (String[] args)
    {
            double sgpa =0;
            student s1 =new student();
            s1.getinfo();
            s1.details();
            sgpa =s1.calculation ();
            System.out.printf (" \n The  SGPA  of  the
                    student  is :    %0.2f / 10.00 ", sgpa);

    }
}
```

Output:

```
Enter The number of courses : 5

Enter The USN and Name : 1BM21CS108 Gopal

Enter The Marks (out of 100) and Credits :

Course 1 : 98 5

Course 2 : 78 4

Course 3 : 67 4

Course 4 : 98 3

Course 5 : 89 3

 The Student Details Are  :

 USN: 1BM21CS108
 Name: Gopal

         Course-1      Course-2      Course-3      Course-4      Course-5
Marks :    98.00         78.00         67.00         98.00         89.00
Credits:     5             4             4             3             3

Credit sum: 19.0

The SGPA of the Student  is : 8.79 /10.00
```

LAB Program 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.

Observation:

```java
import java.util.Scanner;
class book
{
    String name;
    private String author;
    private double price;
    private int numPages;
    Scanner get = new Scanner(System.in);

    book(int n)
    {
        System.out.printf("\n Enter the Name of Book (%d): ", n);
        name = get.nextLine();
        price = 0;
        numPages = 0; numPages = 0;
        author = "<Not SET>";
    }

    void getBookInfo(int n)
    {
        System.out.printf("\n Enter the Details of Book:(%d): \n
                Book Name: %0 s", n, this.name)

        System.out.printf("\n Author: "); author = get.nextLine();
        System.out.printf("No of pages: "); numPages = get.nextInt();
        System.out.printf(" Price: "); price = get.nextDouble();
    }

    String toString() int n
    {
        return("\n <----- Book Details -----> \n Book Name: "
            + name + "\n Author: " + author + "\n No. of Pages: " +
            numPages + "\n Price:" + price);
    }
}
```

```java
class bookMain
{
  public static void main (string[] args)
  {
    int n; int choice;
    string bookName;
    book b[];
    Scanner get = new Scanner(System.in);
    System.out.print ("\n Enter No of Books : "); n=get.nextInt();
    b = new book[n];
    for (int i=0; i<n; i++)
      b[i] = new book(i+1);

    for (int i=0; i<n; i++)
      b[i].getBookInfo(i+1);
    System.out.println(" \n It<------- All Book details ----->");
    for (int i=0; i<n; i++)
      System.out.println(b[i].tostring());
      System.out.println(b[i].tostring(i+1));
  }
}
```

Output:

```
Enter The Number of Books: 2

Enter The Name Of the Book (1) : dataStructures

Enter The Name Of the Book (2) : objectOrientedJava

Enter The Details of Book: (1) :
Book Name :dataStructures
Author: A R Persey
No.Of Pages: 689
Price: 455.99

Enter The Details of Book: (2) :
Book Name :objectOrientedJava
Author: Schildt
No.Of Pages: 1120
Price: 699.78

        <-----All Books Detail----->

<-----Book 1d Details----->
Book Name:dataStructures
Author: A R Persey
No.Of Pages: 689
Price: 455.99

<-----Book 2d Details----->
Book Name:objectOrientedJava
Author: Schildt
No.Of Pages: 1120
Price: 699.78
```

LAB Program 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.

Observation:

Prog-4

```java
import java.util.scanner;
abstract class shape
{   int i1, i2;
    abstract void printarea();
}
class rectangle extends shape
{
    void printarea()
    { System.out.println("\n Area : "+ (i1*i2));
    }
}

class triangle extends shape
{
    void printarea()
    { System.out.println("\n Area of Triangle:" (i1*i2/2));
    }
}
class circle extends shape
{
    void printarea()
    {
        System.out.println("\n Area : "+ ( 3.1415*i1*i2));
    }
}

class shapeMain
{
    public static void main (String[] args)
    {
        scanner get=new scanner(system.in);
        int choice;
        triangle t = new triangle();
        rectangle r = new rectangle();
        circle c = new circle();

        System.out.println("\n 1.Rectangle \n 2Triangle \n 3circle");
```

```java
System.out.println ("\n Enter the choice:");
choice = get.nextInt();
switch (choice)
{
    case 1:
                System.out.println ("\n Enter Height and width:" );
                r.i1 = get.nextInt(); r.i2 = get.nextInt();
                r.printarea();
                break;

    case 2:     System.out.println ("\n Enter altitude & base:" );
                t.i1 = get.nextInt(); b.i2 = get.nextInt();
                t.printarea();
                break;

    case 3:
                System.out.println ("\n Enter the radius:" );
                c.i1 = get.nextInt();
                c.printarea();
                break;

    default:    System.out.println ("Input Error!");
                System.exit(0);

    }
  }
}
```

(2)

Output:

```
1. Rectangle
2. Triangle
3. Circle

Enter the choice: 1

Enter Height and Width:10 4

Area: 40

G:\NoTePadPP\MyJava\OOJ_LAB\Week8>java shapeMain

1. Rectangle
2. Triangle
3. Circle

Enter the choice: 2

Enter altitude and base:10 5

Area of Triangle: 25

G:\NoTePadPP\MyJava\OOJ_LAB\Week8>java shapeMain

1. Rectangle
2. Triangle
3. Circle

Enter the choice: 3
Enter the radius :5

Area: 78.53750000000001
```

LAB Program 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

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Prog 5.

```java
import  java.util.scanner;
import  java.lang.Math;

abstract class  account
{
   String name, accountNo, typeOfAccount;
   double  balance;
   Boolean  chequeBook;
   abstract  void  balanceDisplay();
   abstract  void  balanceCredit();
   abstract  void  balanceDebit();
   abstract  void  balanceCheck(double amount);
   abstract  void  operation();
}

class  curAcc extends  account
{
   Scanner get = new  Scanner(System.in);
   double  minBalance;
   curAcc ()
   {
      System.out.println("\n <---- Welcome to  current  Account,
         Enter the  below details to  create an account ---->");
      System.out.printf(" Name :"); name = get.nextLine();
      typeOfAccount = "Current Account";
      accountNo = "SBE".concat("CUR-").concat(name);
      System.out.printf("Your  Account  No is %s",
            accountNo);
      minBalance =1000;
      balance =0;
      firstDeposit();
   }
   void  firstDeposit(){
   System.out.println("\n You need to have min balance
     of "+ minBalance+" Rupees, else you will be charged
     "+fine01()+" every month \n Deposit Now! ");
```

```java
        balance(redit();
        System.out.println("\n Thank you for creating an Account!\n");
        this.operation();
    }

    void fineCheck()
    {
        int k;
        if (balance <1000)
        {
            System.out.println("\n You need to have minimum
            balance of "+ minBalance +" Rupees, else you will be
            charged " + fineCal() + "\n Deposit Now!. ");
            System.out.println(" Press 1 to deposit or you
            will be charged with "+ fincal());
            System.out.print(" Choice : "); k=get nextInt();
            if (k == 1)
                balance(redit();
            else
                balance -= fineCal();
        }
    }

    double fineCal()
    {
        double fine=0;
        if (balance <0)
        { fine = 100.0; }
        else
        if (balance >= 0)
        { fine = 50; }
        return fine;
    }

    void balanceCheck (double amount)
    {
        if (amount > balance)
        { System.out.println("\n The Withdraw Amount exceeds
            the Balance, check your balance and try again!!");
            balanceDisplay();
            operation();
        }
    }
```

(2)

```java
void balanceCredit()
{
    double amount;
    System.out.printf("\n Enter the amount to deposit : ");
    amount = getnextDouble();
    balance + = amount;
    System.out.printf("\n %0.4f amount is credited. Total balance
          = %0.4f ", amount, balance);

    fineCheck();
}

void balanceDebit()
{
    double amount;
    System.out.printf("\n Enter the amount to withdraw : ");
    amount = get.nextDouble();
    balanceCheck(amount);
    balance - = amount;
    System.out.printf("\n %0.4f amount was debited. total

        balance = %0.4f ", amount, balance);
    fineCheck();
}

void balanceDisplay()
{
    int choice, ft
    System.out.printf("\n total balance = %0.4f ", balance);
}

void operation()
{
    int choice, flag=0;
    do
    {
        System.out.printf("\n Enter the choice: \n 1. Deposit
        \n 2. withdraw \n 3. Display Balance \n 4. Exit \n Choice:");
        choice = get.nextInt();

        switch(choice)
        {
            case 1:  this.balanceCredit();
                     break;
            case 2:  this.balanceDebit();
                     break;
            case 3:  this.balanceDisplay();
                     break;
```

(3)

```java
case 4: System.exit(0);
default : System.out.printf (" \n Error Input  Give  choice  again !!",
          operation ();
}
  System.out.printf("\n Do  you  wish  to  continue ? Press  1
    to   continue :");
     flag = get.nextInt();
  } while (flag == 1);
 }
}

class   savAcc  extends  account
 {
    Scanner   get = new scanner (system.in);
    double  interestRate;
    double   interest;
    int    years;
    savAcc ()
     {
        System.out.println ("\n--Welcome  to  savings Account. Enter
         the below details  to  create  an  Account --->");
          System.out.printf (" Name : ") ; name = get.nextline();
          typeOfAccount ="savings Account";
          chequeBook = false;
          accountNo = "SBE".concat ("SAV-").concat (name);
          System.out.printf (" Your  Account  No is  %s ", accountNos);
           balance = 0;
           interestRate = 0.08;
           interest = 0;
           firstDeposit();
        }
     void  first Deposit()
      {
         int k;
         System.out.printf ("\n Do you  wish  to  deposit  money  now?
           press  1  to  deposit : ");
          k = get.nextInt();
          if (k == 1)
          balanceCredit();
```

(4)

```java
System.out.printf("\n Thank you for creating an Account!\n");
this.operation();
}

void operation()
{
    int choice, flag = 0;
    do
    {
        System.out.printf("\n Enter the choice: \n 1.Deposit \n 2. withdraw
        \n 3. Display Balance \n 4.Interest Display \n 5. Exit \nChoice:");
        choice = get.nextInt();
        switch (choice)
        {
            case 1: this.balanceCredit();
                    break;
            case 2: this.balanceDebit();
                    break;
            case 3: this.balanceDisplay();
                    break;
            case 4: this.compoundInt();
                    break;
            case 5: system.exit(0);

            default : System.out.printf("\n Error input Give
                    choice again!");
        }
                        operation();
            System.out.printf("\n Do you wish to continue?
            Press 1 to continue :");
            flag = get.nextInt();
        }while (flag == 1);
    }

void balanceCheck (double amount)
{
    if (amount > balance)
    { System.out.printf("\n The withdraw Amount exceeds the
        Balance, check your balance and try again!.");
        balanceDisplay();
        operation();
    }
}
```

(5)

```java
void  balanceCredit ()
{
   double  amount;
   System.out.printf ("\n Enter  the  amount  to  deposit :");
    amount = get.nextDouble ();
    balance+ = amount;
    System.out.printf ("\. %0.4f   amount  is  Credited,  total  Balance = %.4f
        ", amount, balance);
}

 void  balanceDebit ();
   {
      double  amount;
      System.out.printf ("\n Enter  the  amount  to  withdraw: ");
       amount = get.nextDouble ();
        balanceCheck (amount);
         balance - = amount;
        System.outfprintf ("\n %0.4f  amount  was  Debitted,  Total  Balance
          = %.4f ", amount, balance);
    }
   void  balanceDisplay ()
     {
        System.out.printf ("\n Total  balance = %0.4f ", balance);
     }
 void  compoundInt ()
    {  int k;
       if (balance == 0)
       {  System.out.printf ("\n You  have  zero  balance'.  Press
          1  to  Deposit  and  try  again'. ");
          k = get.nextInt ();
          if (k == 1)
          balanceCredit ();
          operation ();

         }
       System.out.printf ("\n Enter  the  No of  years:");
       years = get.nextInt ();
```

```java
        interest = balance * Math.pow ((1+ InterestRate),years) - balance;
        System.out.print (" \n Initial  Balance:   %o4.f \n Interest: %.4e ",
           balance,interest);
         balance + = interest;
          System.out.println ("\n Final Balance :%o4.f ",balance);
      }
   }


class    bank
{
    public static void  main (string[] args)
    {
        int  savCount = 0, curCount = 0, K, n = 0;
        Scanner. get = new  Scanner (system.in);
        System.out. println ("\n Enter No  of  Accounts (Max is 20): "}
         n = get.nextInt();
         savAcc s[];
         curAcc c[];
         s = new  savAcc[10];
         c = new  curAcc[10];
         do
         {
           System.out. println ("\n <---- Enter  the  type  of Account --->");
           System.out. println ("\n 1.savings  \n 2.Current \n choice:"}
           K = get.nextInt();
           switch(K)
           {
              case 1: s[savCount++] = new savAcc();
                    break;
                case 2:  c[curCount++] = new curAcc();
                      break;

                default: System.out.printf(" Input Error!");
             }
          }while ((savCount + curCount) < n  && savCount < 10  && curCount<10);
       }
   }
}
```

Output:

```
Enter the No Of Accounts(MAX is 20): 2

<-----Enter the Type Of Account----->
1.Savings
2.Current
Choice: 1

<-----Welcome to Savings Account, Enter the below details to create an Account----->
Name: Amarnath
Your Account No is SBE-SAV-Amarnath
Do you wish to deposit money now? Press 1 to deposit : 1

Enter the amount to deposit: 10000

10000.0000 amount is Credited, Total balance = 10000.0000
Thank you are creating An Account!

Enter the choice:
1.Deposit
2.Withdraw
3.Display Balance
4.Interest Display
5.Exit
Choice: 2

Enter the amount to Withdraw: 5000

5000.0000 amount was Debitted, Total balance = 5000.0000
Do you wish to continue? Press 1 to continue :4

<-----Enter the Type Of Account----->
1.Savings
2.Current
Choice: 2

<-----Welcome to Currents Account, Enter the below details to create an Account----->
Name: Gils
Your Account No is SBE-CUR-Gils
You need Have min balance of  1000.0 Rupees, else you will be charged 50.0 every month
Deposit Now!
```

(a)

```
Deposit Now!

Enter the amount to deposit: 1001

1001.0000 amount is Credited, Total balance = 1001.0000
Thank you are creating An Account!

Enter the choice:
1.Deposit
2.Withdraw
3.Display Balance
4.Exit
Choice: 2

Enter the amount to Withdraw: 500

500.0000 amount was Debitted, Total balance = 501.0000
You need Have min balance of  1000.0 Rupees, else you will be charged 50.0
Deposit Now!
Press 1 To deposit or you will be charged with50.0
Choice: 2

Do you wish to continue? Press 1 to continue :1

Enter the choice:
1.Deposit
2.Withdraw
3.Display Balance
4.Exit
Choice: 3

Total balance = 451.0000
Do you wish to continue? Press 1 to continue :1

Enter the choice:
1.Deposit
2.Withdraw
3.Display Balance
4.Exit
Choice: 1

Enter the amount to deposit: 1000

1000.0000 amount is Credited, Total balance = 1451.0000
Do you wish to continue? Press 1 to continue :1

Enter the choice:
1.Deposit
```

(b)

```
1.Deposit
2.Withdraw
3.Display Balance
4.Exit
Choice: 4
```

(c)