

OOJ LAB RECORD

AJITH M S

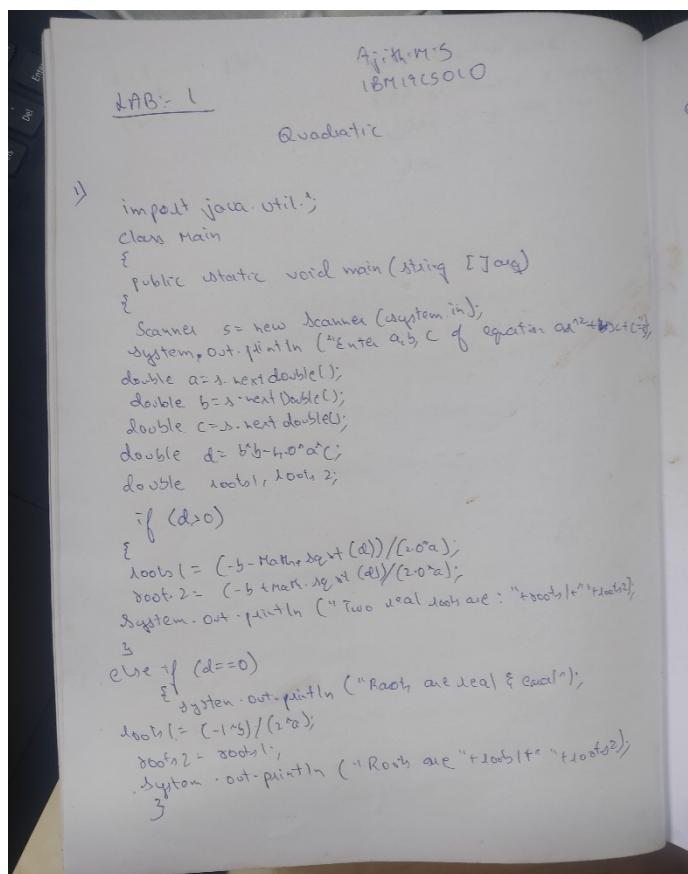
1BM19CS010

LAB-1

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 discriminant $b^2 - 4ac$ is negative, display a message stating that there are no real solutions.

OBSERVATION:



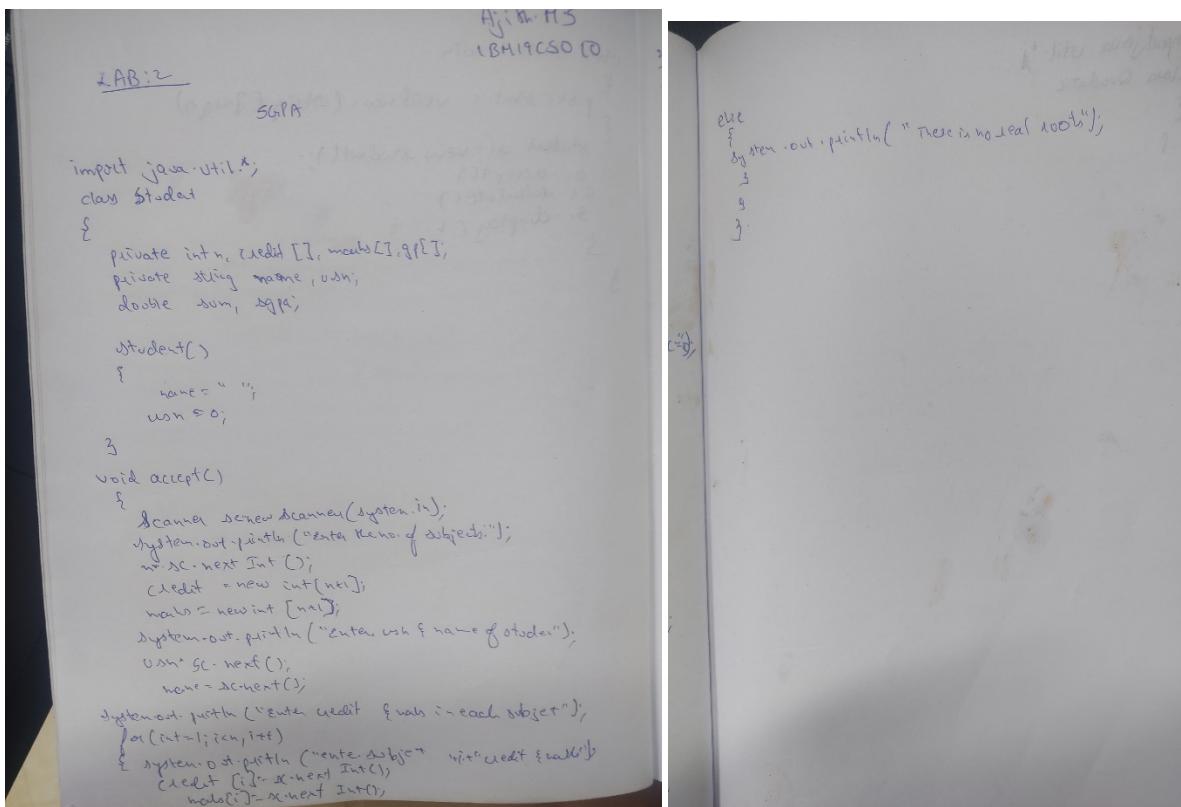
OUTPUT:

```
Enter a,b,c of the equation ax^2+bx+c=0:  
1 2 1  
0.0  
Roots are real and equal  
root1: -1.0root2:-1.0  
  
C:\Users\Hima\Desktop>java Quadratic.java  
  
C:\Users\Hima\Desktop>java Quadratic  
Enter a,b,c of the equation ax^2+bx+c=0:  
1 1 1  
-3.0  
roots are imaginary  
  
C:\Users\Hima\Desktop>java Quadratic.java  
  
C:\Users\Hima\Desktop>java Quadratic  
Enter a,b,c of the equation ax^2+bx+c=0:  
1 -1 -6  
25.0  
roots are real and unequal  
root1 : -2.0 root2:3.0
```

LAB-2

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:



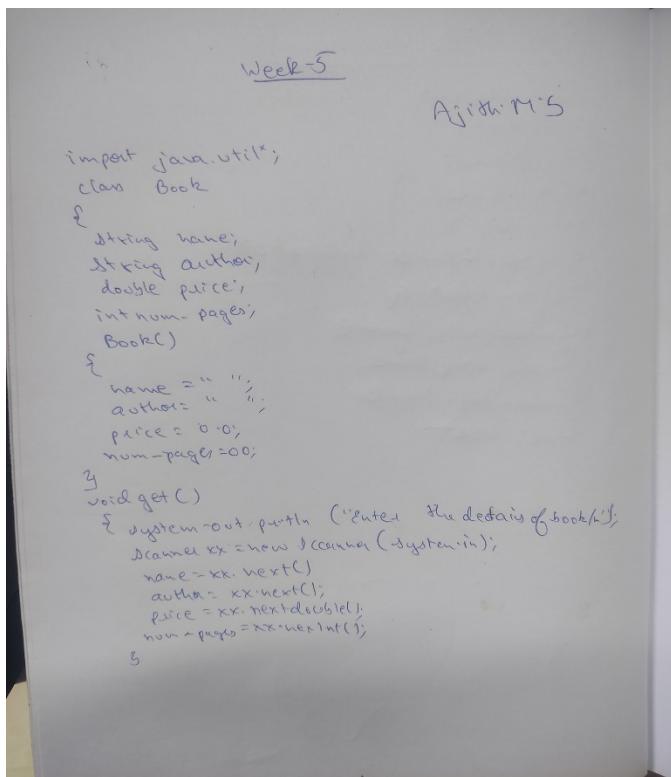
OUTPUT:

```
Enter the usn and name
1bm1234 serena
Enter number of subjects
3
Enter the credits and marks in each subject
Enter the credits and marks in subject 1
3 56
Enter the credits and marks in subject 2
5 79
Enter the credits and marks in subject 3
4 99
usn:1bm1234 name:serena
marks:56 grade points:5
marks:79 grade points:8
marks:99 grade points:10
sgpa:7.9166666666666667
```

LAB-3

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:



```

public void toDisplay()
{
    return("A book," + "Author" + "Title :" + price + "InName of P
          eculm - Pages);
}

class Bookmain
{
    public static void main(String args[])
    {
        int n;
        Scanner sc = new Scanner(System.in);
        System.out.println("Enter the number of objects");
        n = sc.nextInt();
        Book x[] = new Book[n];
        for (int i = 0; i < n; i++)
        {
            x[i] = new Book();
            x[i].get();
            for (int j = 0; j < i; j++)
            {
                System.out.println("Details of Book " + (j + 1));
                System.out.println(x[j]);
            }
        }
    }
}

```

OUTPUT:

```

Enter the number of objects:
3

Enter the details of the book
twincke dan 450 1200

Enter the details of the book
Dwen Rossie 345 560

Enter the details of the book
life Ambrose 100 234

details of book1:

Book:twincke
Author:dan
Price:450.0
Number of pages:1200

details of book2:

Book:Dwen
Author:Rossie
Price:345.0
Number of pages:560

details of book3:

Book:life
Author:Ambrose
Price:100.0

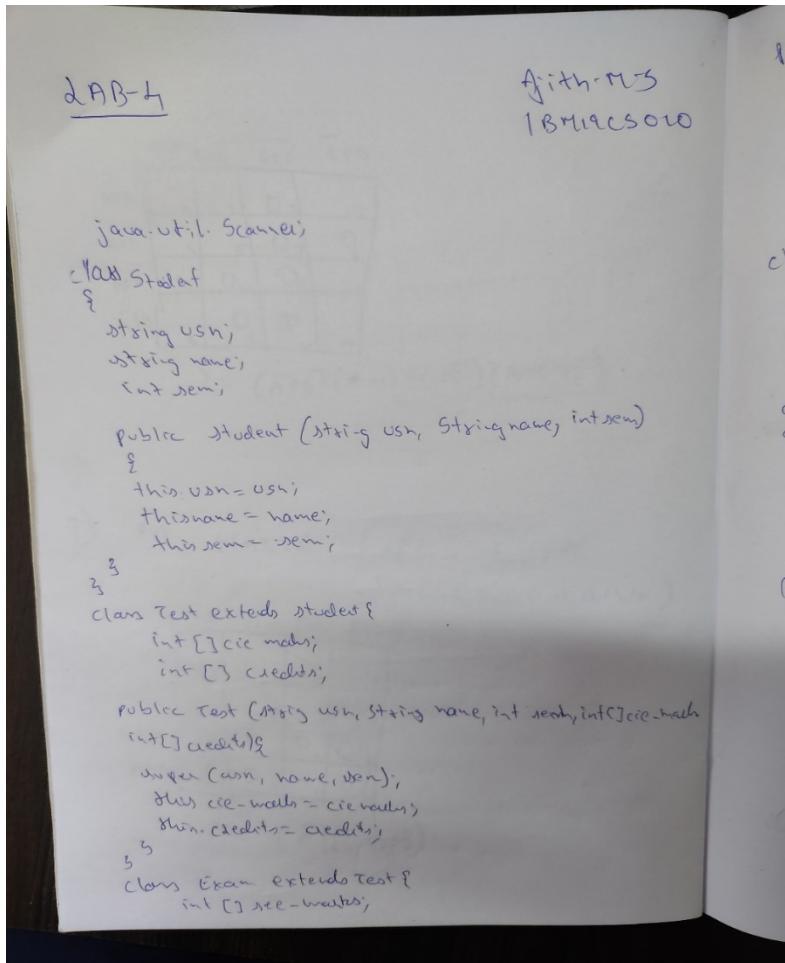
```

LAB-4

4. Develop a Java program to create a class Student whose variables are usn, name and sem.

Derive a class Test from Student to include an array of cie marks of each course and their corresponding credits in another array. Derive a class Exam from Test which includes an array of see marks. Derive a class Result which calculates the grade for each course and the SGPA. Create n student objects and displays all the above details.

OBSERVATION



```

public Exam (string usn, String name, int year, int totalmarks,
    int[] credits, int[] see_marks);
    user (usn, name, year, see_marks);
    user. see_marks = see_marks;
}

class results extends Exam {
    public Account (String usn, String name, int year, int totalmarks,
        int[] credits, int[] see_marks)
    {
        double sgpa;
        char [] grade = new char [credits.length];
        public void cal - grade (int tot_marks)
        {
            int sum = 0;
            for (int i=0; i < credits.length; i++)
                double marks = see_marks[i] +
                    (year - marks[i])/2.0;
                if (marks >= 90)
                    sum = credits[i]*10;
                    grade[i] = 'S';
                else if (marks >= 80 && marks < 90)
                    sum = credits[i]*9;
                    grade[i] = 'A';
                else if (marks >= 70 && marks < 80)
                    sum = credits[i]*8;
                    grade[i] = 'B';
                else if (marks >= 60 && marks < 70)
                    sum = credits[i]*5;
                    grade[i] = 'C';
                else
                    sum = credits[i]*0;
                    grade[i] = 'E';
            }
            sum = sum + credits[0]*6;
            grade[0] = 'D';
            if (marks >= 10 && marks < 50)
                else if (marks >= 50 && marks < 55)
                    sum = credits[0]*5;
                    grade[0] = 'E';
                else if (marks >= 55 && marks < 60)
                    sum = credits[0]*0;
                    grade[0] = 'F';
                else
                    sum = credits[0]*0;
                    grade[0] = 'P';
            sgpa = sum / tot_marks;
        }
    }

    public void display()
    {
        System.out.println ("USN: " + usn);
        System.out.println ("Name: " + name);
        System.out.println ("Year: " + year);
        System.out.println ("Grade of each subject:");
        for (int i=0; i < credits.length; i++)
        {
            System.out.println ("Subject " + (i+1) + ": " + grade[i]);
            System.out.println ("SGPA: " + sgpa);
        }
    }
}

```

```

class results {
    public void display()
    {
        System.out.println ("USN: " + usn);
        System.out.println ("Name: " + name);
        System.out.println ("Year: " + year);
        System.out.println ("Grade of each subject:");
        for (int i=0; i < credits.length; i++)
        {
            System.out.println ("Subject " + (i+1) + ": " + grade[i]);
            System.out.println ("SGPA: " + sgpa);
        }
    }
}

```

```

class Main {
    public static void main(String args[]) {
        Scanner sc = new Scanner(System.in);
        System.out.print("Enter number of students:");
        int n = sc.nextInt();
        Result[] r = new Result[n];
        int[] tot_credits = new int[n];
        for (int i = 0; i < n; i++) {
            System.out.println("Enter marks for student " + (i + 1));
            int[] marks = new int[5];
            for (int j = 0; j < 5; j++) {
                int mark = sc.nextInt();
                marks[j] = mark;
            }
            System.out.println("Enter credits for student " + (i + 1));
            int credit = sc.nextInt();
            r[i].setMarks(marks);
            r[i].setCredits(credit);
        }
    }
}

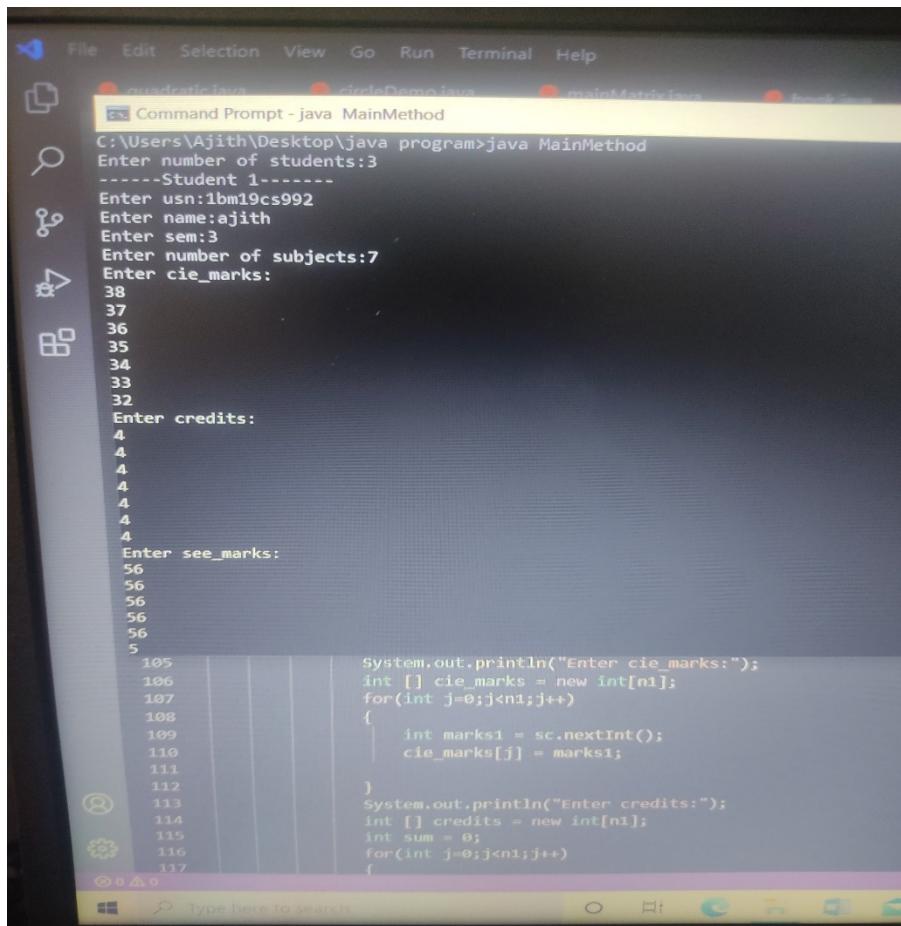
```

```

tot_credits[i] = sum;
System.out.println("Enter student details:");
int[] see_marks = new int[5];
for (int j = 0; j < 5; j++) {
    int marks = sc.nextInt();
    see_marks[j] = marks;
}
see_marks[i] = marks;
Result res = new Result(cash, name, sem, cie_marks, credit, see_marks);
for (int k = 0; k < n; k++) {
    System.out.println("Details of student " + (k + 1) + ":");
    res[k].calGrade();
    res[k].display();
}

```

OUTPUT:



```
C:\Users\Ajith\Desktop>java MainMethod
Enter number of students:3
-----Student 1-----
Enter usn:1bm19cs992
Enter name:ajith
Enter sem:3
Enter number of subjects:7
Enter cie_marks:
38
37
36
35
34
33
32
Enter credits:
4
4
4
4
4
4
4
Enter see_marks:
56
56
56
56
56
56
5
105
106
107
108
109
110
111
112
113
114
115
116
117
```

The screenshot shows a Java IDE interface with a terminal window displaying the execution of a Java program named "MainMethod". The program prompts the user for the number of students (3), and then for details of the first student (usn: 1bm19cs992, name: ajith, sem: 3). It then asks for the number of subjects (7) and the marks for each subject (cie_marks) and credits. The user inputs are as follows:

- Student 1:
 - usn: 1bm19cs992
 - name: ajith
 - sem: 3
 - cie_marks: 38, 37, 36, 35, 34, 33, 32
 - credits: 4, 4, 4, 4, 4, 4, 4
- see_marks: 56, 56, 56, 56, 56, 56, 5

The code in the terminal window is partially visible, showing the logic for reading input from the user and calculating the sum of credits.

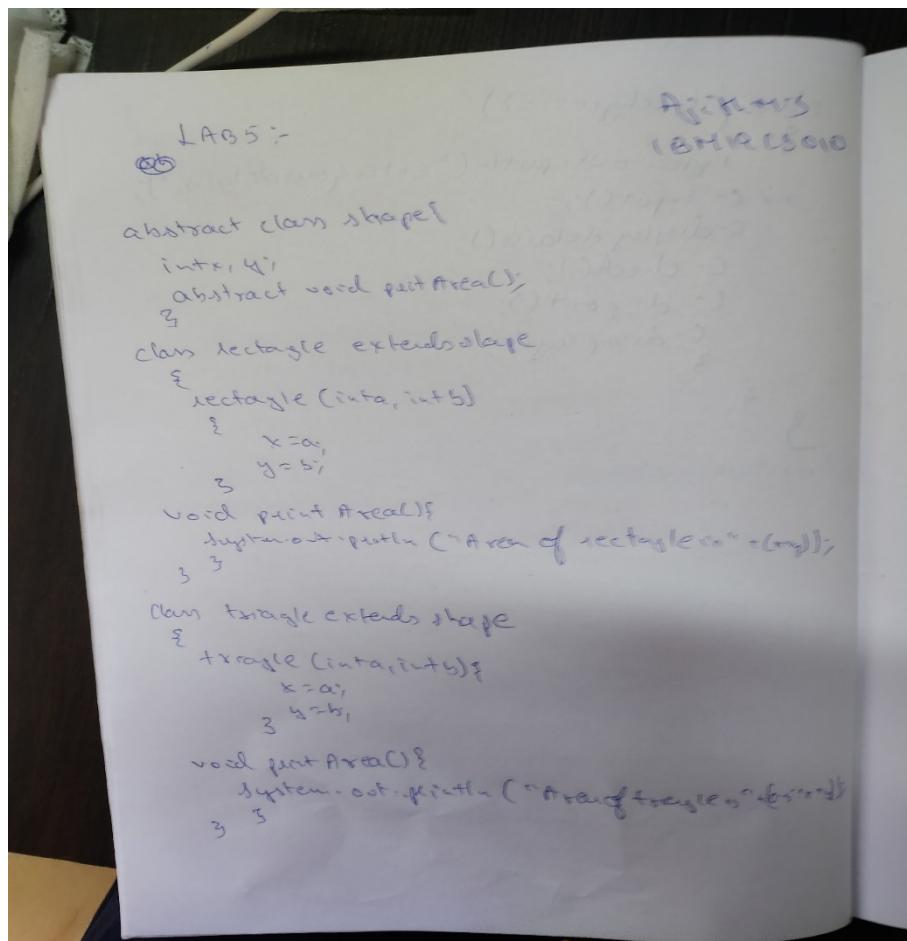
LAB-5

5. 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

OBSERVATION:



```

class circle extends shape {
    circle (center) {
        x = center;
    }
    void printArea() {
        System.out.println("Area of circle = " + (3.142 * x * x));
    }
}

public class main {
    public static void main (String args) {
        rectangle rect = new rectangle (5,5);
        triangle tri = new triangle (6,3);
        circle cir = new circle (5);
        rect.printArea();
        tri.printArea();
        cir.printArea();
    }
}

```

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IBM19CS010
(2023-2024)

LAB :- 5

```

import java.util.Scanner;
class Account {
    String name, account, acctype;
    double balance;
    Account () {
    }
    void input() {
        Scanner sc = new Scanner (System.in);
        System.out.println ("Enter account number");
        name = sc.next();
        account = sc.next();
        acctype = sc.next();
        System.out.println ("Enter balance");
        balance = sc.nextDouble();
    }
    void displaydetails() {
        System.out.println ("Name = " + name + " account = " + account);
        System.out.println ("Balance = " + balance + " account type = " + acctype);
    }
    void displaybalance() {
        System.out.println ("Balance = " + balance);
    }
}

```

2-8A3

```

class current extends Account
{
    current()
    {
        acctype = "current";
        double minbal = 5000;
        void check()
        {
            double penalty = 100;
            if (balance < minbal)
                balance = balance - penalty;
            System.out.println("penalty is imposed");
            System.out.println("balance = " + balance);
        }
        else
            System.out.println("penalty not imposed");
    }
    void deposit()
    {
        Scanner sc = new Scanner(System.in);
        sc.nextLine();
        double amt = sc.nextDouble();
        balance = balance + amt;
    }
}

class savacc extends Account
{
    savacc()
    {
        acctype = "savings";
    }
}

```

```

double ci;
void compound(int n, int)
{
    ci = balance * (Math.pow((1+(0.02)), n));
    balance = balance + ci;
    System.out.println("Compound interest: " + ci);
    System.out.println("Unbalance: " + balance);
}

void withdrawl(double amt)
{
    double minbal = 5000;
    if (balance < 5000)
        System.out.println("amount can't be withdrawn as
        min balance (5000) constraint will be violated");
    else
        balance = balance - amt;
}

class account main
{
    public static void main(String[] args)
    {
        Scanner sc = new Scanner(System.in);
        System.out.println("Enter for args 2 for current account");
        int acctype = sc.nextInt();
        Savacc s = new Savacc();
        Current c = new Current();
        if (acctype == 1)

```

```

{
    System.out.println("Enter your details:");
    Scanner sc = new Scanner(System.out);
    sc.nextLine();
    System.out.println("Display details");
    System.out.println("No. of fore cubes to be");
    System.out.println("Computer per unit (in), tempo (sec):");
    int n = sc.nextInt();
    int t = sc.nextInt();
    System.out.println("Enter no. of units");
    int u = sc.nextInt();
    int sum = 0;
    while(u != 0) {
        sum += (n * t);
        u--;
    }
    System.out.println("Total cost is " + sum);
}

else if (choice == 2) {
    System.out.println("Enter 1.deposit 2.withdraw 3.exit");
    int w = sc.nextInt();
    if (w == 1) {
        System.out.println("Enter the amount");
        double amt = sc.nextDouble();
        s.deposit(amt);
        s.display();
    } else if (w == 2) {
        System.out.println("Enter the amount");
        double amt = sc.nextDouble();
        s.withdraw(amt);
        s.display();
    } else {
        System.out.println("Exit");
    }
}

```

```

else if (choice == 3) {
    System.out.println("Enter your details");
    Scanner sc = new Scanner(System.out);
    sc.nextLine();
    System.out.println("Display details");
    System.out.println("Check");
    System.out.println("Deposit");
    System.out.println("Withdraw");
}

```

OUTPUT:

```
C:\Windows\System32\cmd.exe
Microsoft Windows [Version 10.0.18363.1139]
(c) 2019 Microsoft Corporation. All rights reserved.

C:\Users\Ajith\Desktop\java program>java area
Area of rectangle is 30
Area of triangle is 6.0
Area of circle is 201.088

C:\Users\Ajith\Desktop\java program>
```

```
C:\Windows\System32\cmd.exe - java AccountMain
Microsoft Windows [Version 10.0.18363.1139]
(c) 2019 Microsoft Corporation. All rights reserved.

C:\Users\Ajith\Desktop\java program>java AccountsMain
Error: Could not find or load main class AccountsMain

C:\Users\Ajith\Desktop\java program>java AccountMain
enter 1 for savings account 2 for current account
1
enter your details:
enter name ,acc number
xyz
123455
enter balance
63000

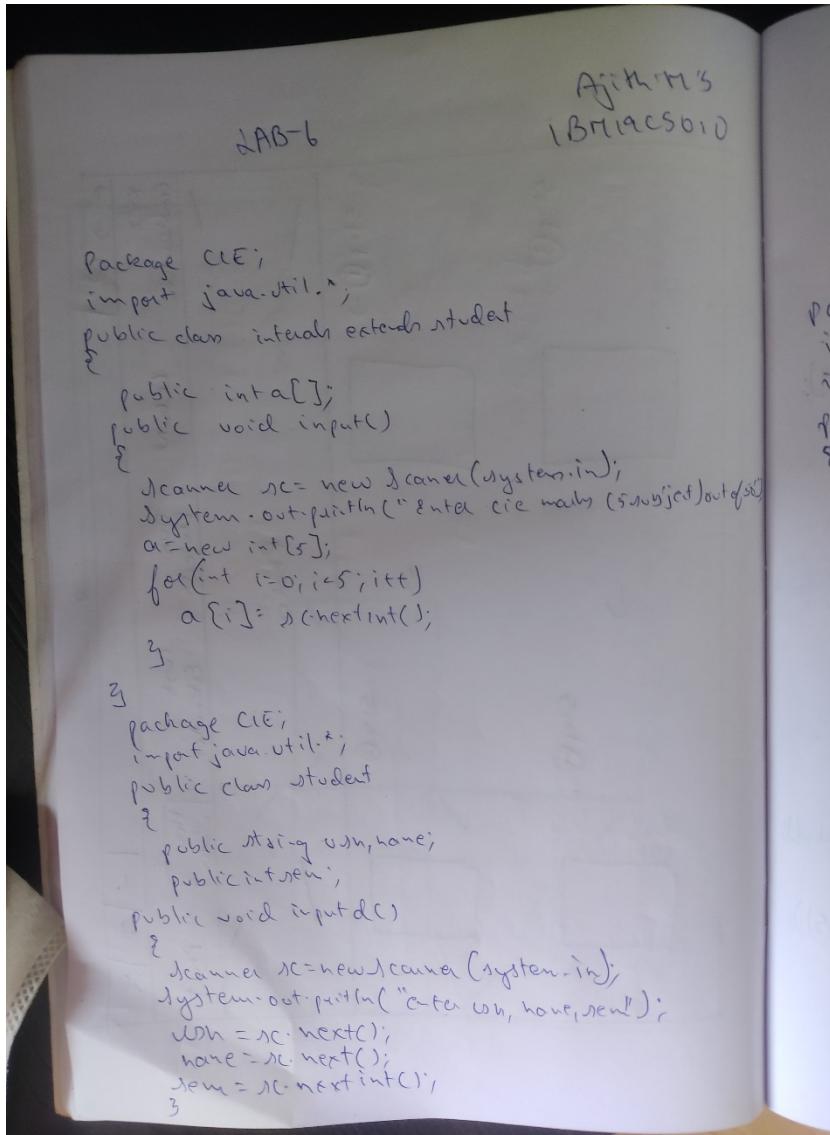
name=xyz
accnumber=123455
balance=63000.0
account type=savings
number of times interest to be compounded per unit t(n),time in years
9
3
compound interest:114041.82
balance:177041.82enter 1:deposit 2:withdrawl 3:exit
```

LAB-6

6. Solve this program and write the procedure you have used to execute this in your observation

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.

OBSERVATION:



```

public void display()
{
    System.out.print("Name=" + name + " Name=" + name);
}

package SEE;
import CIE.*;
import java.util.*;
public class extends CIE.Student
{
    public int a[];
    public void input()
    {
        Scanner sc = new Scanner(System.in);
        System.out.println("Enter marks (subject) out of 100");
        a = new int[5];
        for (int i=0; i<5; i++)
            a[i] = sc.nextInt();
    }
}

import CIE.*;
import SEE.*;
import java.util.*;
class total
{
    public static void main(String[] args)
}

```

```

Scanner sc = new Scanner(System.in);
System.out.println("Enter no. of students");
int n = sc.nextInt();
CIE.intervals in[] = new CIE.intervals[n];
SEE.extends ex[] = new SEE.extends[n];
int total;
for (int j=0; j<n; j++)
{
    System.out.println("Enter " + (j+1) + " student details");
    in[j] = new CIE.intervals();
    ex[j] = new SEE.extends();
    in[j].input();
    ex[j].input();
}
System.out.println("Total marks");
for (int j=0; j<n; j++)
{
    in[j].display();
    System.out.println("In student " + (j+1) + " total");
    for (int k=0; k<5; k++)
        System.out.println(in[j].a[k] + ex[j].a[k]);
}

```

OUTPUT:

```
total.java:111: error: illegal start of expression
    /CIE.student s=new CIE.student();/
               ^
total.java:114: error: ';' expected
    Scanner sc=new Scanner(System.in);
               ^
14 errors

C:\Users\Ajith\Desktop\java program\today>javac total.java
C:\Users\Ajith\Desktop\java program\today>java total
enter number of students
2
enter1student details:
enter usn,name,sem
1bm19cs
ajith
3
enter cie marks(5 subjects) out of 50
30
31
32
33
34
enter see marks(5 subjects) out of 100
60
61
62
63
64
enter2student details:
enter usn,name,sem
1bm19cs01
ak
3
enter cie marks(5 subjects) out of 50
32
32
32
32
enter see marks(5 subjects) out of 100
61
61
61
62
```

LAB7

7. Write a program to demonstrate generics with multiple object parameters.

OBSERVATION:

LAB-7

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(BME16S010)

```

import java.util.Scanner;
class Gener<A,B,C> {
    A ob1;
    B ob2;
    C ob3;
}

Gener<A ob1, B ob2, C ob3> ob = new Gener();
ob.ob1 = ob1;
ob.ob2 = ob2;
ob.ob3 = ob3;

void print() {
    System.out.println("The type of A is :" + ob1.getClass().getname());
    System.out.println("The type of B is :" + ob2.getClass().getname());
    System.out.println("The type of C is :" + ob3.getClass().getname());
}

A get1() {
    return ob1;
}

B get2() {
    return ob2;
}

C get3() {
    return ob3;
}

```

```

Class GenerMain
public static void main(String args[])
{
    Scanner sc = new Scanner(System.in);
    System.out.print("Enter character: ");
    char c = sc.next();
    char At(0);
    Gener<Character, Boolean, String> ob = new Gener<Character, Boolean, String>(c, true, "yes");
}

```

```

    ob.print();
    char x = ob.get1();
    System.out.println("value: " + x);
    boolean y = ob.get2();
    System.out.println("value: " + y);
    String s = ob.get3();
    System.out.println("value: " + s);
}

```

OUTPUT:

```
Microsoft Windows [Version 10.0.18363.1198]
(c) 2019 Microsoft Corporation. All rights reserved.

C:\Users\Ajith\Desktop\java program>java GenerMain
Enter a character:
a
The type of A is:java.lang.Character
The type of B is:java.lang.Boolean
The type of C is:java.lang.String
value: a
value: true
value: yes

C:\Users\Ajith\Desktop\java program>
```

LAB-8

8. Write a program that demonstrates handling of exceptions in inheritance tree. Create a base class called “Father” and derived class called “Son” which extends the base class. In Father class, implement a constructor which takes the age and throws the exception Wrong Age() when the input age=father’s age.

OBSERVATION:

LAB-8

Algorithms

BHU.ACSD@

import java.util.Scanner;

class WrongAge extends Exception

{ int age;

void age(int a) { }

age = a;

}

public String toString() { }

return "Age entered is incorrect";

}

}

class Father { }

int age;

father(int a) { }

age = a;

}

}

class Son extends Father { }

int age;

son(int a) { }

age = a;

}

}

void check() throws WrongAge

if (age >= allAge) { }

throw new WrongAge(age);

}

}

else { }

System.out.println("Correct ages entered");

System.out.println("Father age: " + a + " <= " + "Son age: " + b);

}

}

class Exception Main { }

public static void main (String args[]) { }

Scanner sc = new Scanner (System.in);

System.out.println("Enter father age: ");

int a = sc.nextInt();

System.out.println("Enter son age: ");

int b = sc.nextInt();

Son ss = new Son (a, b);

try { }

ss.check();

}

catch (WrongAge e) { }

System.out.println(" "+e);

}

OUTPUT:

```
25-10-2020 10:09 <DIR> WEB DEVELOPMENT
 6 File(s) 204,646,373 bytes
 8 Dir(s) 401,133,101,056 bytes free

C:\Users\Ajith\Desktop>cd java program

C:\Users\Ajith\Desktop\java program>javac exceptions.java

C:\Users\Ajith\Desktop\java program>java exceptionsmain
Error: Could not find or load main class exceptionsmain

a{C:\Users\Ajith\Desktop\java program>java ExceptionsMain
Enter father's age:
22
Enter son's age:
1
Correct ages entered
Father's age:22
Son's age:1

C:\Users\Ajith\Desktop\java program>java ExceptionsMain
Enter father's age:
52
Enter son's age:
20
Correct ages entered
Father's age:52
Son's age:20

C:\Users\Ajith\Desktop\java program>
```

LAB-9

9. Write a program which creates two threads, one thread displaying “BMS College of Engineering” once every ten seconds and another displaying “CSE” once every two seconds.

OBSERVATION:

LAB-9 Executive.

Class Thread1, implements Runnable

```
{ Thread1;
  String a;
  int b;
  Thread1 (String name)
  {
    a = n;
    b = n;
    t = new Thread (this, "NThread");
    System.out.println ("(" + "t");
    t.start();
  }
```

```
public void run()
```

```
{ try
  {
    for (int n=5; n>0; n--)
    {
      System.out.println (a);
      Thread.sleep (b);
    }
  }
  catch (InterruptedException e)
  {
    System.out.println ("Child Thread Interrupted");
    System.out.println ("Child thread quitting");
  }
}
```

Class Thread2

```
{ public static void main (String ss[])
  {
    Thread m1 = new Thread1 ("B.M.S College
      - Bangalore, 10000);
    Thread m2 = new Thread1 ("CSE, 2000);
    m1.start();
    m2.start();
  }
}
```

OUTPUT:

```
Microsoft Windows [Version 10.0.18363.1198]
(c) 2019 Microsoft Corporation. All rights reserved.

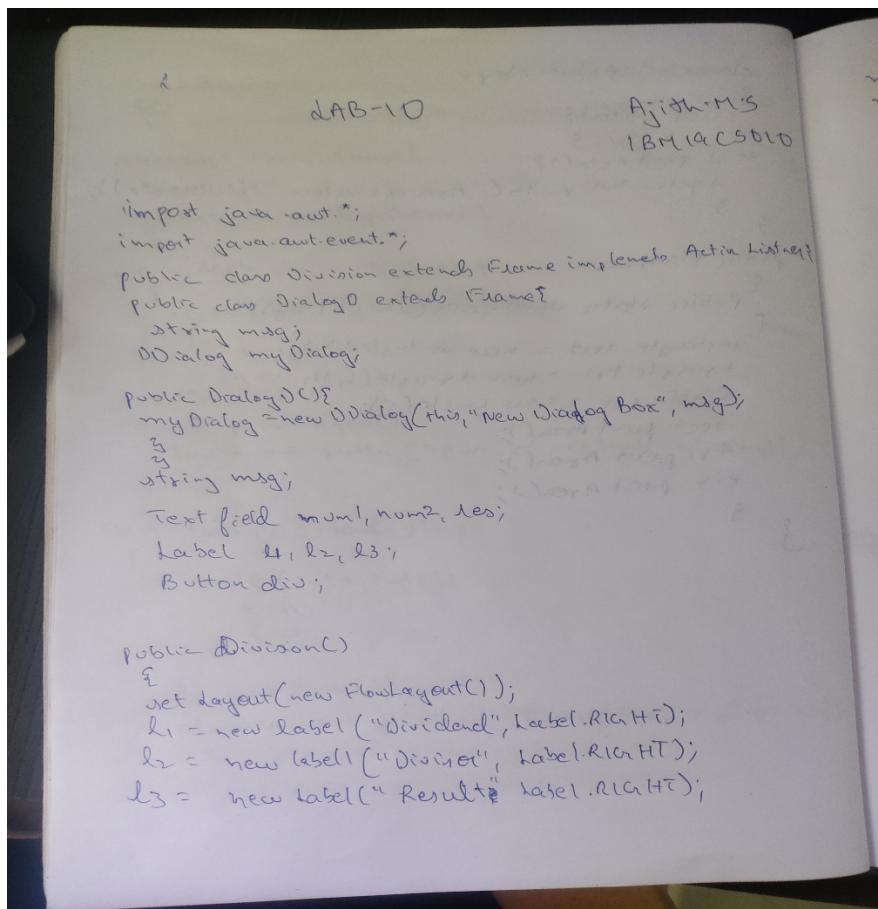
C:\Users\Ajith\Desktop\java program>java Thread2
CT:Thread[NThread,5,main]
CT:Thread[NThread,5,main]
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Child Thread quitting

C:\Users\Ajith\Desktop\java program>
```

LAB-10

10. Write a program that creates a user interface to perform integer divisions. The user enters two numbers in the text fields, Num1 and Num2. The division of Num1 and Num2 is displayed in the Result field when the Divide button is clicked. If Num1 or Num2 were not an integer, the program would throw a Number Format Exception. If Num2 were Zero, the program would throw an Arithmetic Exception Display the exception in a message dialog box.

OBSERVATION:



S
5010
listner;

```

num1 = new TextField("0");
num2 = new TextField("0");
res = new TextField("0");
div = new Button("Divide");
add(l1);
add(num1);
add(l2);
add(num2);
add(l3);
add(res);
add(div);
div.addActionListener(this);
add window Listener (new MyWindowAdapter());
}
public void actionPerformed(ActionEvent)
{
    num1=0; num2=0;
    try
    num1 = Integer.parseInt(this.num1.getText());
    num2 = Integer.parseInt (this.num2.getText());
    double num3 = (double) num1/num2;
    res.setText(String.valueOf (num3));
    msg = "Division Successful";
}
catch (NumberFormatException e)
{
    System.out.println(e);
    e.printStackTrace();
}

```

```

msg = "Nonumber exception";
Dialog dd = new Dialog(this, "Dialog", msg);
dd.setVisible(true);
return;
}

try {
if (num == 0)
throw new ArithmeticException();
msg = "Can't be divided by zero";
}
catch (ArithmeticException e) {
System.out.println("Can't be divided by zero");
label.setText(" ");
msg = "Can't be divided by zero";
}
Dialog dd = new Dialog(this, "Dialog", msg);
dd.setVisible(true);
return;
}

public void paint(Graphics g) {
g.drawString(msg, 80, 100);
}

public static void main (String [args]) {
AppWin appwin = new AppWin();
appwin.setSize(new Dimension(480, 280));
appwin.setTitle("Division");
}

```

```

class Class
{
public
{
    }
}
class Class
{
    }
}

```

```

class MyWindowAdapter extends WindowAdapter {
    public void windowClosing (WindowEvent we) {
        System.exit(0);
    }

class Dialog extends Dialog {
    Dialog (Frame parent, String title, String msg) {
        super (parent, title, false);
        setLayout (new FlowLayout ());
        setSize (300, 300);
        add (new Table (msg));
        button b1;
        add (b1 = new Button ("OK"));
        b1.addActionListener ((ae) -> dispose ());
        add windowListener (new WindowAdapter () {
            public void windowClosing (WindowEvent we) {
                dispose ();
            }
        });
    }
}

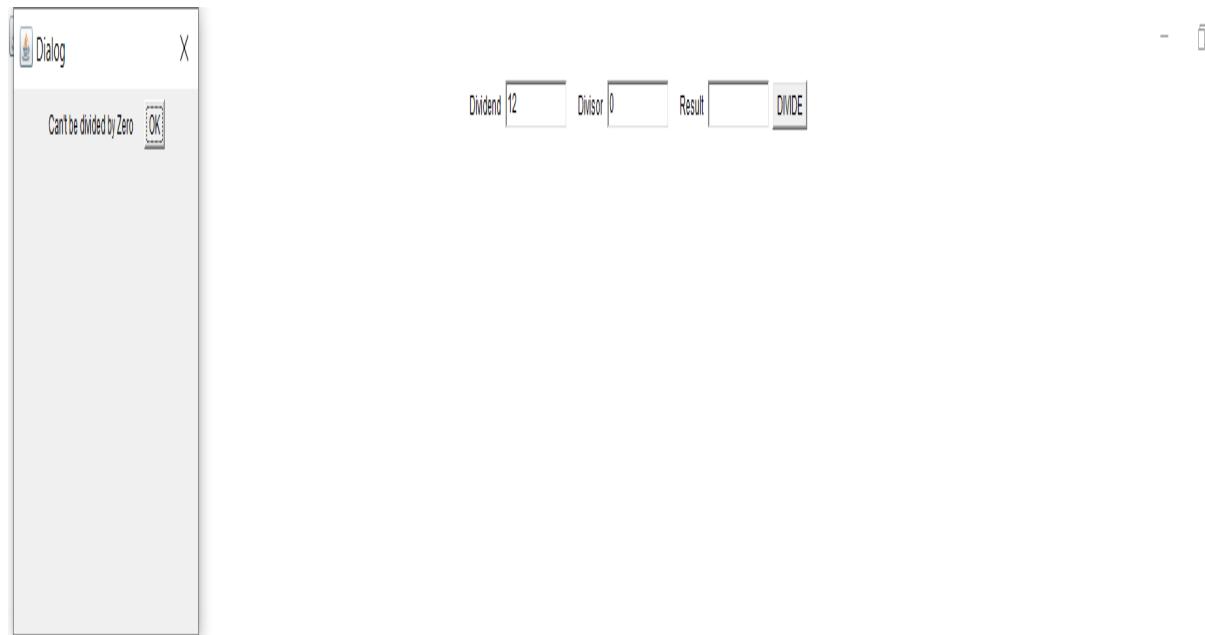
```

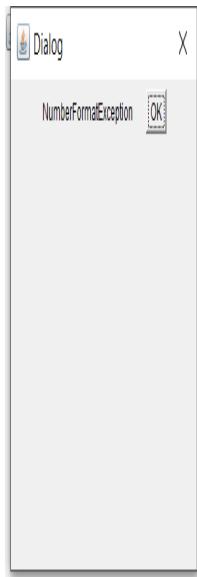
OUTPUT:



Division

Dividend Divisor Result DIVIDE





Dividend Divisor Result DIVIDE

END...

THANK YOU

AJITH MS (1BM19CS010)