B.M.S. College of Engineering

(Autonomous Institution affiliated to VTU, Belagavi)

Department of Computer Science and Engineering

Object Oriented Java – Lab Programs Report

Course code-23CS3PCOOJ

(Batch 2023-2024)

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USN: 1BM22CS346

Semester: III

B.M.S. College of Engineering

(Autonomous Institution affiliated to VTU, Belagavi)

Department of Computer Science and Engineering

Laboratory Certificate

This is to certify that **VAGISHA AJAY** has satisfactorily completed the course of Experiments in Practical **OBJECT-ORIENTED JAVA PROGRAMMING** prescribed by the Department during the odd semester 2023-24.

Name of the candidate: Vagisha Ajay

USN: 1BM22CS346

Semester: III

Signature of the staff in-charge: Head of the Department:

Date:

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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

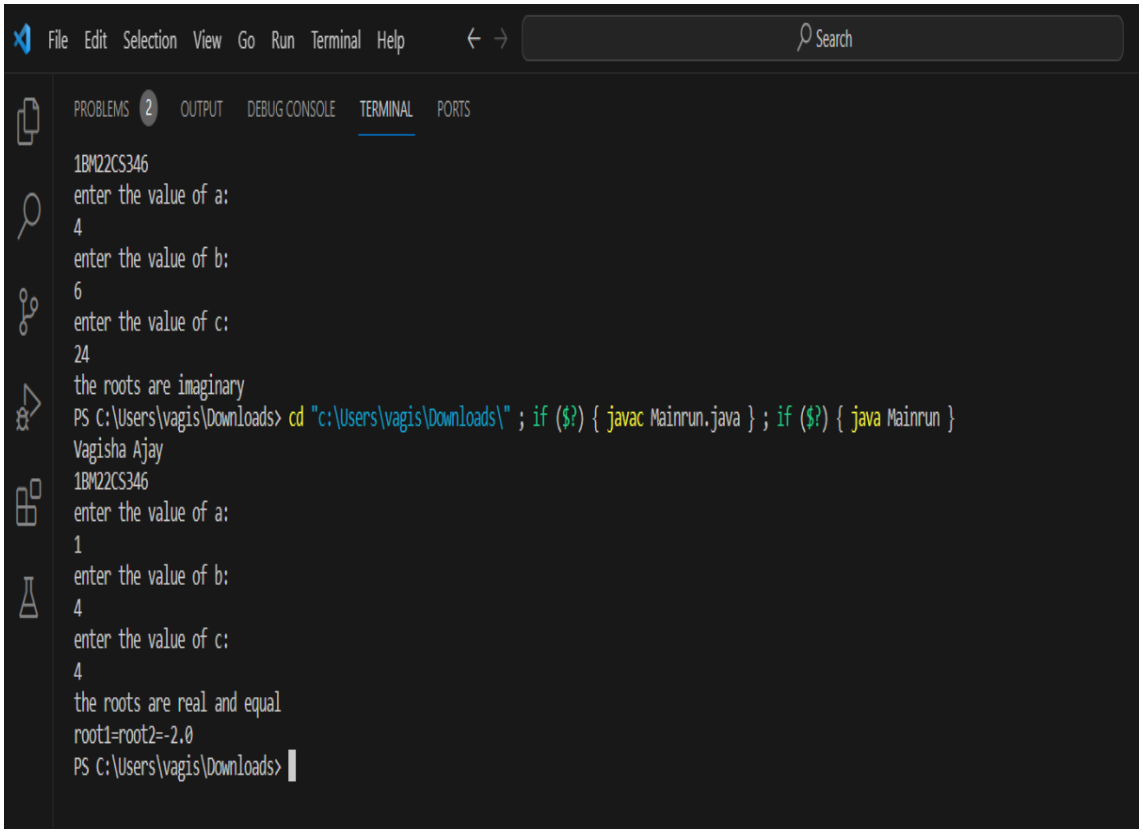
is negative, display a message stating that there are no real solutions.

Code:

```
import java.util.Scanner;
class Quadratic
{
double a,b,c,d,r1,r2;
void calculate()
{
d=b*b-4*a*c;
if(d>0)
{
System.out.println("the roots are real and distinct");
r1=(-b+Math.sqrt(d))/(2*a);
r2=(-b-Math.sqrt(d))/(2*a);
System.out.println("root1="+r1+"and root2="+r2);
}
else if(d==0)
{
System.out.println("the roots are real and equal");
r1=-b/(2*a);
System.out.println("root1=root2="+r1);
}
else
{
System.out.println("the roots are imaginary");
}
}
}
class Mainrun
{
public static void main(String args[])
{
System.out.println("Vagisha Ajay");
System.out.println("1BM22CS346");
Scanner s=new Scanner(System.in);
Quadratic obj=new Quadratic();
System.out.println("enter the value of a:");
obj.a=s.nextDouble();
System.out.println("enter the value of b:");
```

```
obj.b=s.nextDouble();
System.out.println("enter the value of c:");
obj.c=s.nextDouble();
obj.calculate();
}
}
```

Output:



Lab Program 2

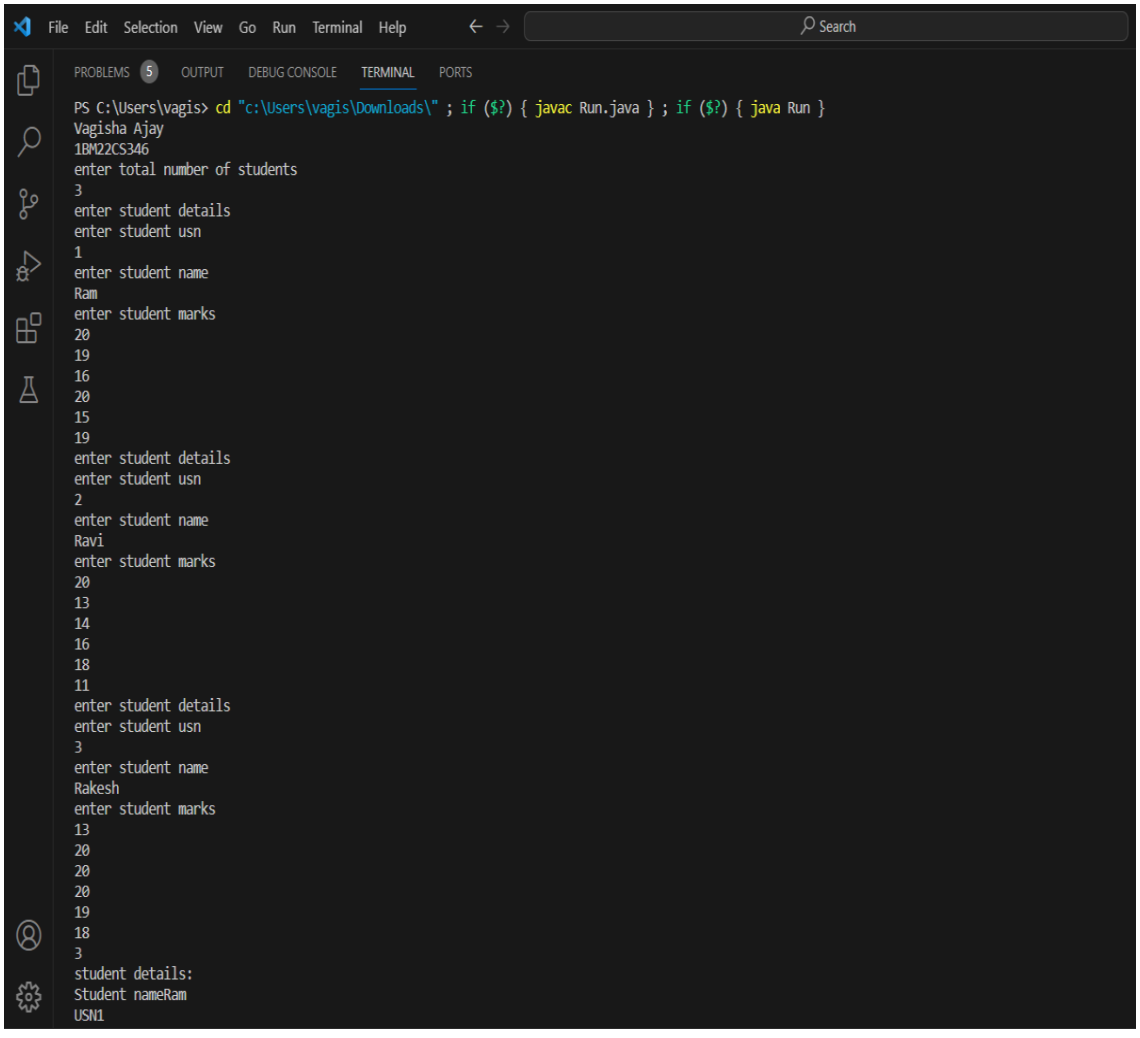
Develop a Java program to create a class Student with members usn, name, an array credits and an array marks. Include methods to accept and display details and a method to calculate SGPA of a student.

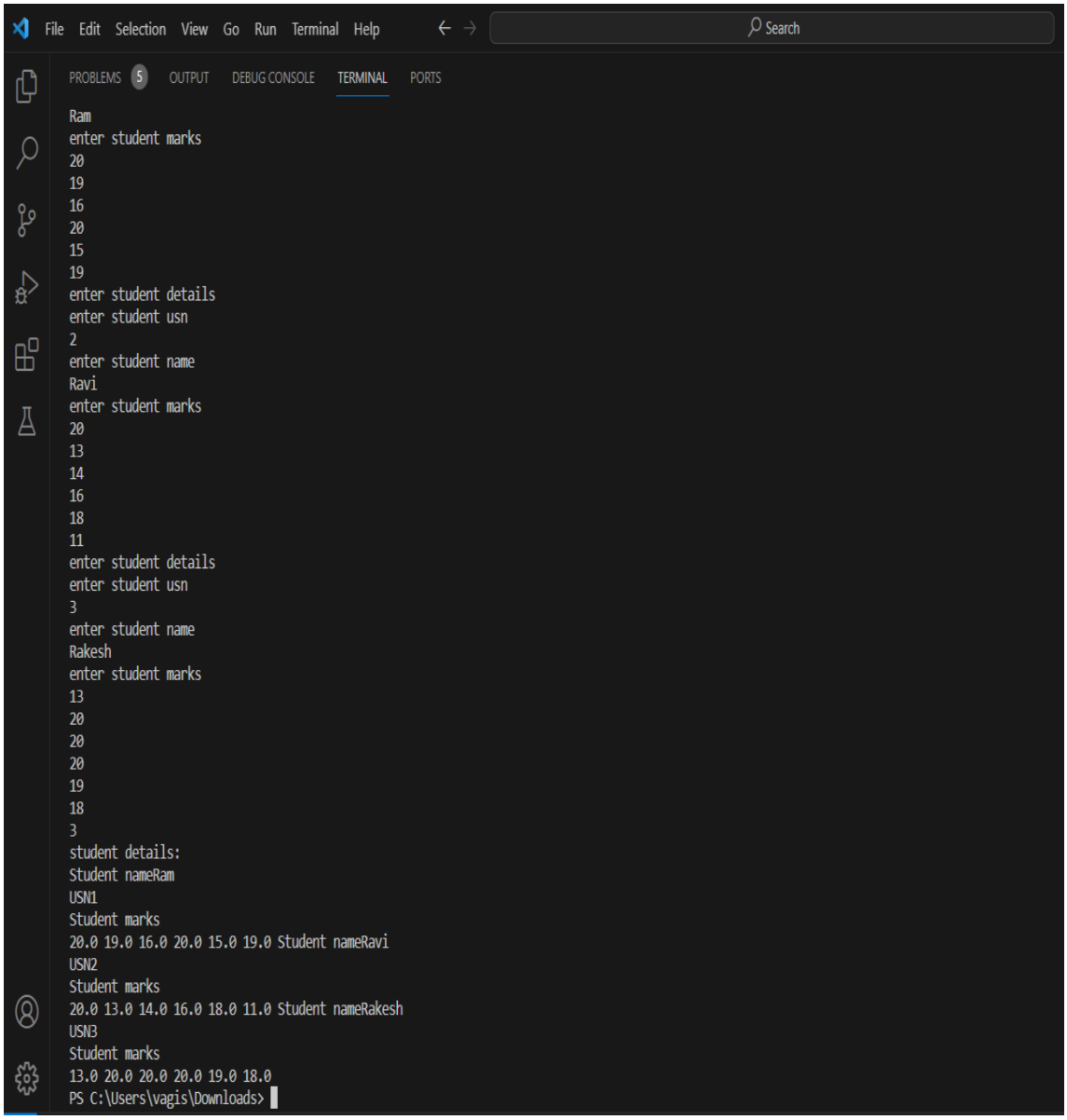
Code:

```
import java.util.Scanner;
class Student
{
int usn,i;
String name=new String();
double marks[]=new double[6];
void student_details()
{
System.out.println("enter student details");
Scanner ss1=new Scanner(System.in);
System.out.println("enter student usn");
usn=ss1.nextInt();
System.out.println("enter student name");
name=ss1.next();
System.out.println("enter student marks");
for(i=0;i<6;i++)
{
marks[i]=ss1.nextInt();
}
}
void display()
{
System.out.println("Student name"+name);
System.out.println("USN"+usn);
System.out.println("Student marks");
for(i=0;i<6;i++)
{
System.out.print(marks[i]+" ");
}
}
}
class Run
{
public static void main(String args[])
{
System.out.println("Vagisha Ajay");
System.out.println("1BM22CS346");
Scanner ss2=new Scanner(System.in);
System.out.println("enter total number of students");
```

```
int n=ss2.nextInt();
Student s1[]=new Student[n];
for(int i=0;i<n;i++)
{
s1[i]=new Student();
s1[i].student_details();
}
System.out.println(n+" \nstudent details:");
for(int i=0;i<n;i++)
{
s1[i].display();
}
}
}
```

Output:





Lab Program 3

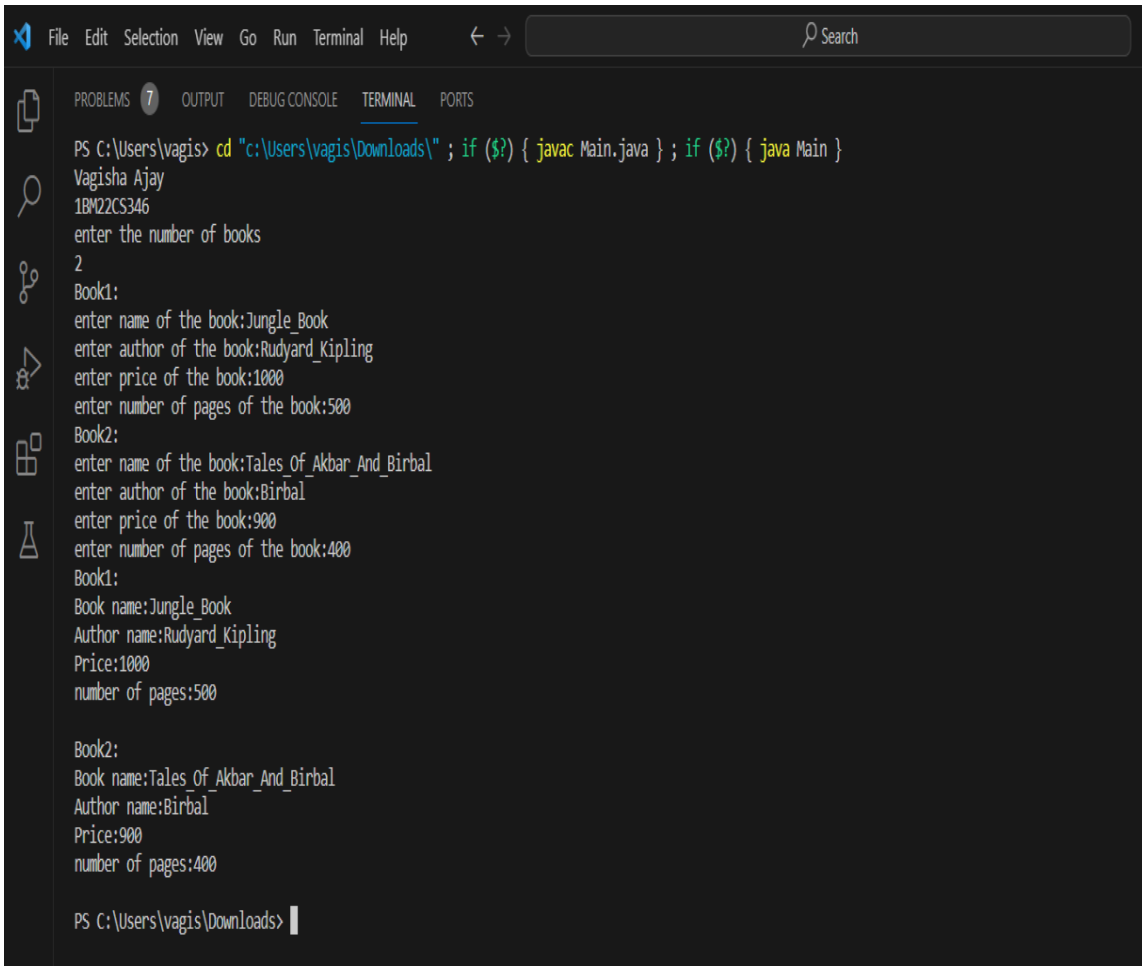
Create a class Book which contains four members: name, author, price, num_pages. Include a constructor to set the values for the members. Include methods to set and get the details of the objects. Include a toString( ) method that could display the complete details of the book. Develop a Java program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

Code:

```
import java.util.Scanner;
class Books
{
String name,author;
int price,numpages;
Books(){}
Books(String name,String author,int price,int numpages)
{
this.name=name;
this.author=author;
this.price=price;
this.numpages=numpages;
}
public String toString()
{
String name,author,price,numpages;
name="Book name:"+this.name+"\n";
author="Author name:"+this.author+"\n";
price="Price:"+this.price+"\n";
numpages="number of pages:"+this.numpages+"\n";
return name+author+price+numpages;
}
}
class Main
{
public static void main(String args[])
{
System.out.println("Vagisha Ajay");
System.out.println("1BM22CS346");
Scanner s=new Scanner(System.in);
int n,price,numpages,i;
String author,name;
System.out.println("enter the number of books");
n=s.nextInt();
Books b[]=new Books[n];
for(i=0;i<n;i++)
{
System.out.println("Book"+(i+1)+":");
System.out.print("enter name of the book:");
name=s.next();
System.out.print("enter author of the book:");
```

```
author=s.next();
System.out.print("enter price of the book:");
price=s.nextInt();
System.out.print("enter number of pages of the book:");
numpages=s.nextInt();
b[i]=new Books(name,author,price,numpages);
}
for(i=0;i<n;i++)
{
System.out.println("Book"+(i+1)+":\n"+b[i]);
}
}
}
```

Output:



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

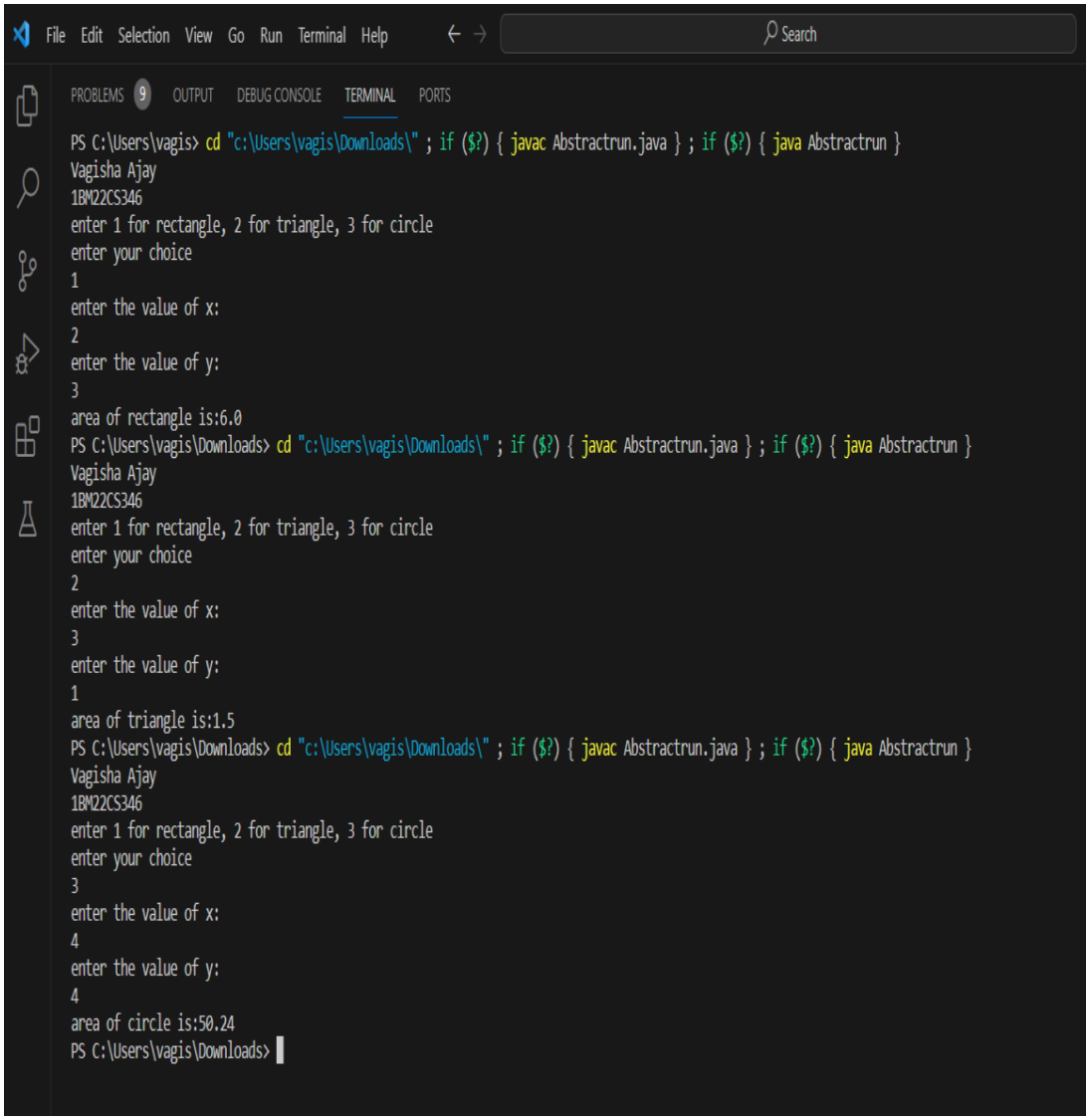
Shape. Each one of the classes contain only the method printArea( ) that prints the area of the given shape.

Code:

```
import java.util.*;
import java.lang.*;
abstract class shape
{
int x,y;
abstract void printarea(double x,double y);
}
class Rectangle extends shape
{
void printarea(double x,double y)
{
System.out.println("area of rectangle is:"+(x*y));
}
}
class Triangle extends shape
{
void printarea(double x,double y)
{
System.out.println("area of triangle is:"+(0.5*x*y));
}
}
class Circle extends shape
{
void printarea(double x,double y)
{
System.out.println("area of circle is:"+(3.14*x*x));
}
}
public class Abstractrun
{
public static void main(String args[])
{
System.out.println("Vagisha Ajay");
System.out.println("1BM22CS346");
Scanner s=new Scanner(System.in);
int ch,x,y;
System.out.println("enter 1 for rectangle, 2 for triangle, 3 for circle");
System.out.println("enter your choice");
ch=s.nextInt();
System.out.println("enter the value of x:");
x=s.nextInt();
System.out.println("enter the value of y:");
y=s.nextInt();
Rectangle r=new Rectangle();
```

```
Triangle t=new Triangle();
Circle c=new Circle();
switch(ch)
{
case 1:
r.printarea(x,y);
break;
case 2:
t.printarea(x,y);
break;
case 3:
c.printarea(x,y);
break;
default:
System.out.println("wrong choice");
}
}
}
```

Output:


File Edit Selection View Go Run Terminal Help
Search
PROBLEMS 9 OUTPUT DEBUG CONSOLE TERMINAL PORTS
PS C:\Users\vagis> cd "c:\Users\vagis\Downloads\" ; if ($?) { javac Abstractrun.java } ; if ($?) { java Abstractrun }
Vagisha Ajay
1BM22CS346
enter 1 for rectangle, 2 for triangle, 3 for circle
enter your choice
1
enter the value of x:
2
enter the value of y:
3
area of rectangle is:6.0
PS C:\Users\vagis\Downloads> cd "c:\Users\vagis\Downloads\" ; if ($?) { javac Abstractrun.java } ; if ($?) { java Abstractrun }
Vagisha Ajay
1BM22CS346
enter 1 for rectangle, 2 for triangle, 3 for circle
enter your choice
2
enter the value of x:
3
enter the value of y:
1
area of triangle is:1.5
PS C:\Users\vagis\Downloads> cd "c:\Users\vagis\Downloads\" ; if ($?) { javac Abstractrun.java } ; if ($?) { java Abstractrun }
Vagisha Ajay
1BM22CS346
enter 1 for rectangle, 2 for triangle, 3 for circle
enter your choice
3
enter the value of x:
4
enter the value of y:
4
area of circle is:50.24
PS C:\Users\vagis\Downloads>

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 Cur-acct and Sav-acct to make them more specific to their requirements. Include the necessary methods in order to achieve the following tasks:

a) Accept deposit from customer and update the balance.

b) Display the balance.

c) Compute and deposit interest

d) Permit withdrawal and update the balance

Check for the minimum balance, impose penalty if necessary and update the balance.

Code:

```
import java.util.*;
class Account
{
public static int min=500;
String name;
int Account_num;
public float o_Price;
Scanner sc=new Scanner(System.in);
public void get_info()
{
System.out.println("Enter Name:");
name=sc.nextLine();
System.out.println("Enter Account Number:");
Account_num=sc.nextInt();
System.out.println("Enter opening Ammount must be >500:");
o_Price=sc.nextFloat();
}
public void show()
{
```

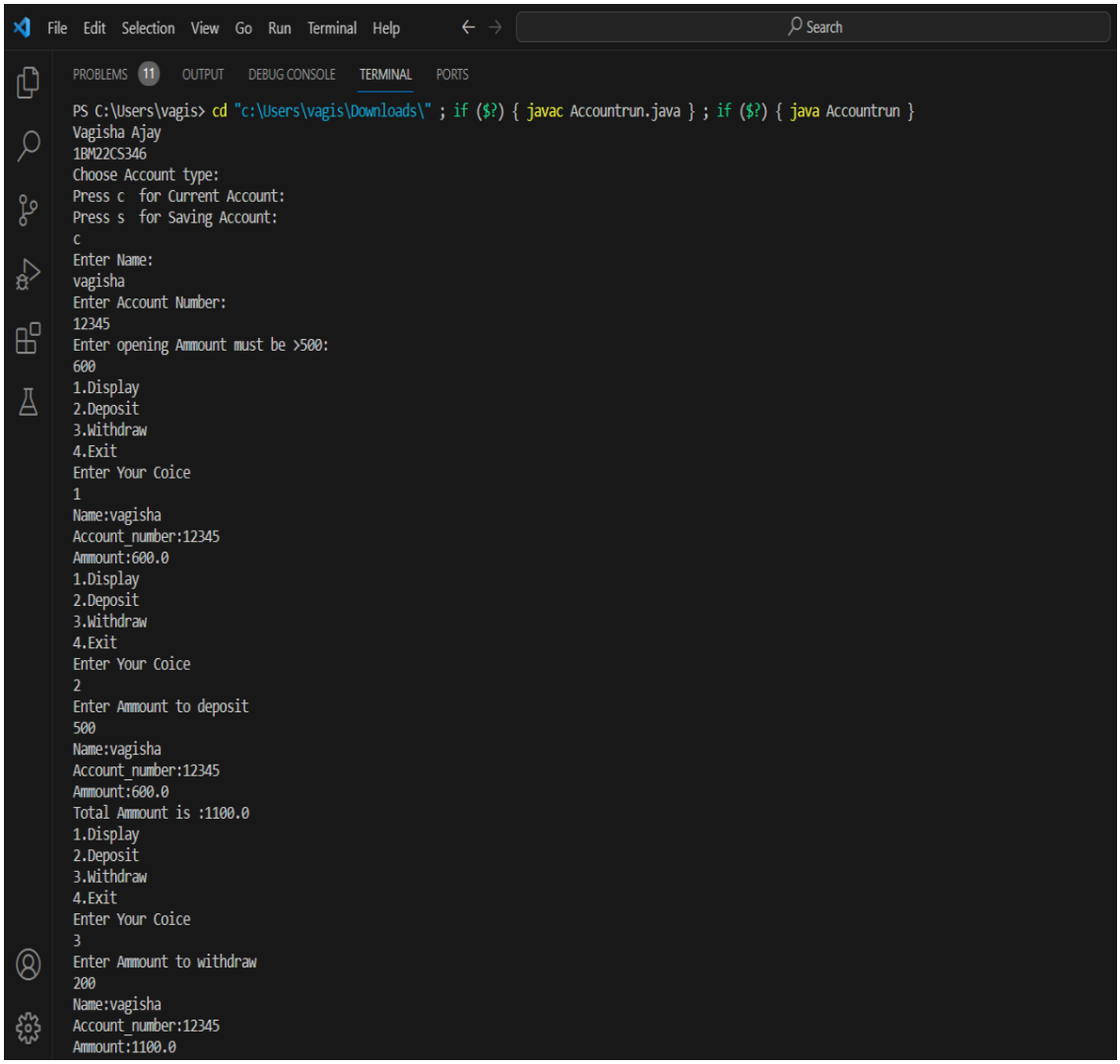
```
System.out.println("Name:"+name);
System.out.println("Account_number:"+Account_num);
System.out.println("Ammount:"+o_Price);
}
}
class  Current  extends Account
{
float deposit,withdraw;
public void deposit()
{
System.out.println("Enter Ammount to deposit") ;
deposit =sc.nextFloat();
show();
o_Price=o_Price+deposit;
System.out.println("Total Ammount is :"+o_Price);
}
public void check_Bal()
{
if(o_Price<500)
{
System.out.println("Amount should be >500");
o_Price=o_Price-150;
System.out.println("You have debited ammount 150 from your acccount as penalty Account balance is:"+o_Price);
}
}
public void withdraw_Bal()
{
System.out.println("Enter Ammount to withdraw");
withdraw=sc.nextFloat();
show();
if(o_Price<500)
{
System.out.println("For withdrawl Balance must >500 Rupee");
}
if(withdraw<o_Price)
{
o_Price=o_Price-withdraw;
System.out.println("After Withdawl Balance "+o_Price);
}
else
{
System.out.println("Insufficent Balance cant not less than 500");
}
check_Bal();
}
}
class Saving extends Account
{
float deposit,withdraw,intr;
public void deposit()
```

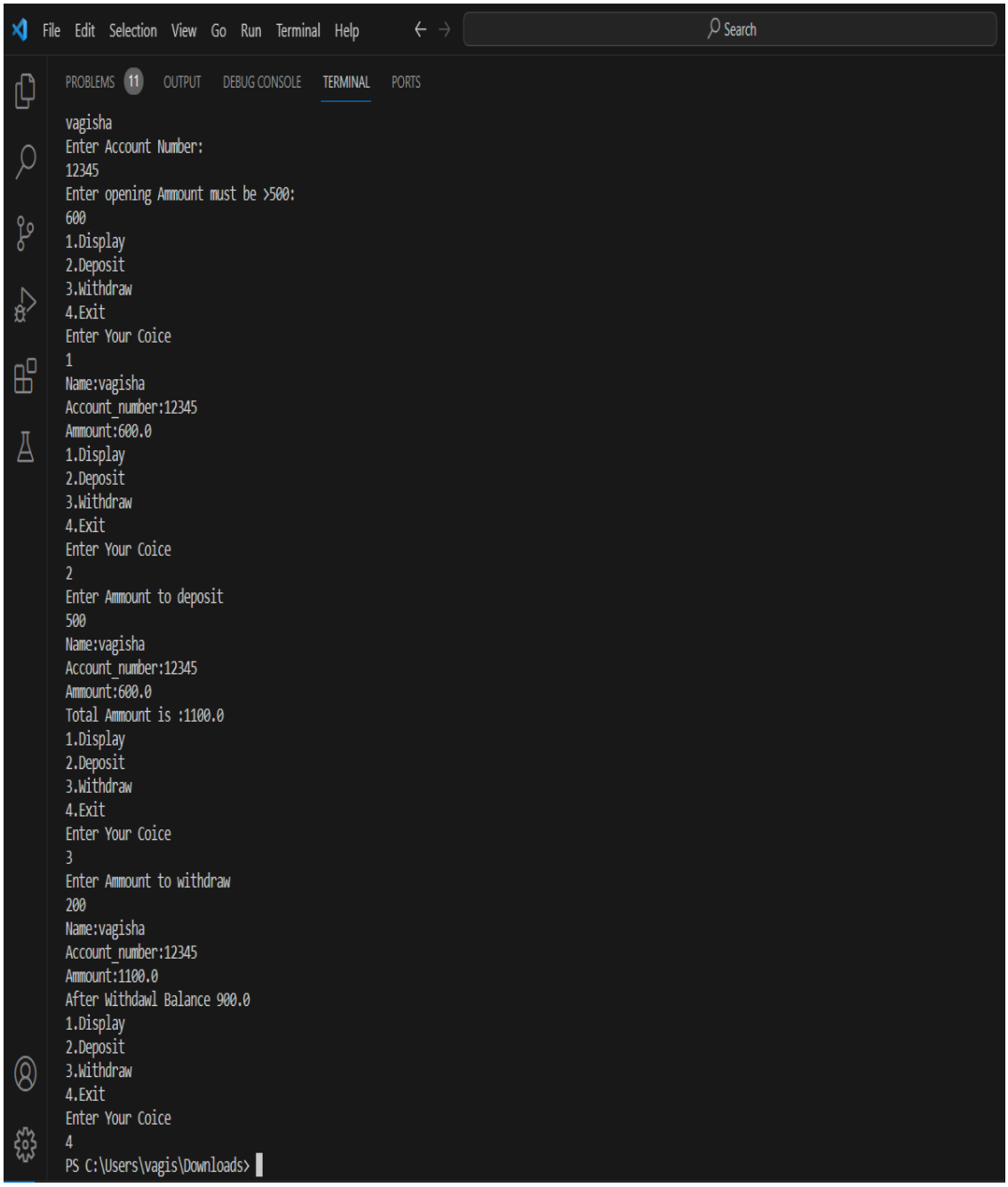
```
{
System.out.println("Eneter Ammount to deposit");
deposit =sc.nextFloat();
show();
o_Price=o_Price+deposit;
System.out.println("Total Ammount is :"+o_Price);
}
public void check_intrest()
{
intr=(o_Price*2)/100;
o_Price=o_Price+intr;
System.out.println("Total Ammount with intrest is :"+o_Price);
}
public void withdraw_Bal()
{
System.out.println("Enter Ammount to withdraw:");
withdraw=sc.nextFloat();
show();
if(withdraw<o_Price)
{
o_Price=o_Price-withdraw;
System.out.println("After Withdawl Balance: "+o_Price);
}
else
{
System.out.println("Insufficent Balance!");
}
}
}
public class Accountrun
{
static String ch;
public static void main(String[] args)
{
    System.out.println("Vagisha Ajay");
    System.out.println("1BM22CS346");
int count=0;
Scanner sc=new Scanner(System.in);
Current  cu=new Current ();
Saving  sav=new Saving ();
System.out.println("Choose Account type:");
System.out.println("Press c  for Current Account:");
System.out.println("Press s  for Saving Account:");    ch=sc.nextLine();
if(ch.equalsIgnoreCase("c"))
{
cu.get_info();
cu.check_Bal();
while(count!=4)
{
System.out.println("1.Display\n2.Deposit\n3.Withdraw\n4.Exit");
```

```
System.out.println("Enter Your Coice");
int cho=sc.nextInt();
switch(cho)
{
case 1:
cu.show();
break;
case 2:
cu.deposit();
break;
case 3:
cu.withdraw_Bal();
break;
case 4:
System.exit(0);
break;
default:
System.out.println("Wrong Choce!");
}
}
}
else if(ch.equalsIgnoreCase("s"))
{
sav.get_info();
while(count!=5)
{
System.out.println("1.Display\n2.Deposit\n3.Withdraw\n4Intrest\n5.Exit");
System.out.println("Enter Your Coice");
int cho=sc.nextInt();
switch(cho)
{
case 1:
sav.show();
break;
case 2: sav.deposit();
break;
case 3:
sav.withdraw_Bal();
break;
case 4:
sav.check_intrest();
break;
case 5:
System.exit(0);
break;
default:
System.out.println("Wrong Choce!");
}
}
}
```

```
else
{
System.out.println("Wrong choice!");
}
}
}
```

Output:




File Edit Selection View Go Run Terminal Help
Search
PROBLEMS 11 OUTPUT DEBUG CONSOLE TERMINAL PORTS
vagisha
Enter Account Number:
12345
Enter opening Ammount must be >500:
600
1.Display
2.Deposit
3.Withdraw
4.Exit
Enter Your Coice
1
Name:vagisha
Account_number:12345
Ammount:600.0
1.Display
2.Deposit
3.Withdraw
4.Exit
Enter Your Coice
2
Enter Ammount to deposit
500
Name:vagisha
Account_number:12345
Ammount:600.0
Total Ammount is :1100.0
1.Display
2.Deposit
3.Withdraw
4.Exit
Enter Your Coice
3
Enter Ammount to withdraw
200
Name:vagisha
Account_number:12345
Ammount:1100.0
After Withdawl Balance 900.0
1.Display
2.Deposit
3.Withdraw
4.Exit
Enter Your Coice
4
PS C:\Users\vagis\Downloads>

Lab Program 6

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.

Code:

```
package CIE;
import java.util.*;
public class Student
{
public int usn,sem;
public String name=new String();
public void student_details()
{
Scanner sc=new Scanner(System.in);
System.out.println("enter student details:");
System.out.println("enter student name:");
name=sc.nextLine();
System.out.println("enter student USN:");
usn=sc.nextInt();
System.out.println("enter student semester:");
sem=sc.nextInt();
}
public void display()
{
System.out.println("Student Name:"+name);
System.out.println("Student USN:"+usn);
System.out.println("Student Semester:"+sem);
}
}
```

```
package CIE;
```

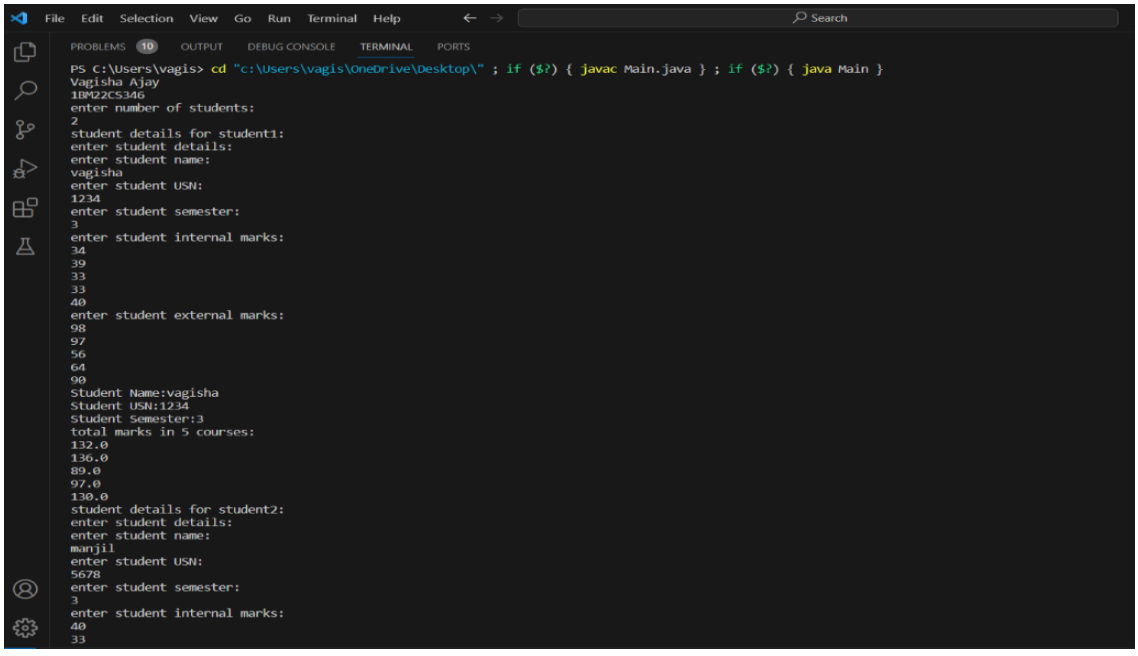
```
import java.util.*;
public class Internals extends Student
{
public int i;
public double imarks[]=new double[5];
public void internal_marks()
{
Scanner s=new Scanner(System.in);
System.out.println("enter student internal marks:");
for(i=0;i<5;i++)
{
imarks[i]=s.nextDouble();
}
}
}
```

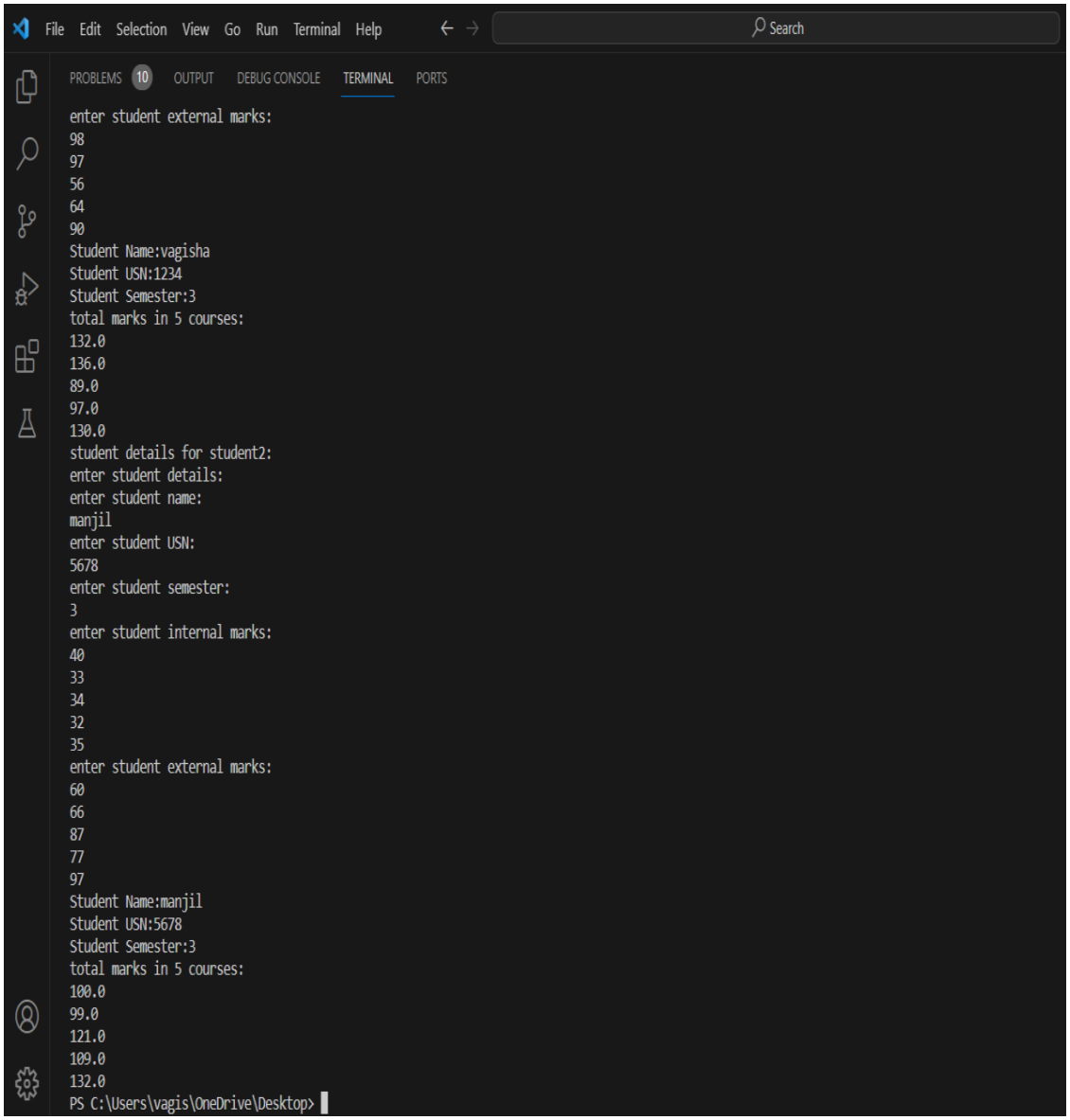
```
package SEE;
import java.util.*;
import CIE.Student;
public class Externals extends Student
{
public int i;
public double emarks[]=new double[5];
public void external_marks()
{
Scanner ss=new Scanner(System.in);
System.out.println("enter student external marks:");
for(i=0;i<5;i++)
{
emarks[i]=ss.nextDouble();
}
}
}
```

```
import java.util.*;
import CIE.*;
import SEE.*;
public class Main
{
public static void main(String args[])
{
    System.out.println("Vagisha Ajay");
    System.out.println("1BM22CS346");
int n,i,j;
double total[]=new double[5];
Scanner sss=new Scanner(System.in);
System.out.println("enter number of students:");
n=sss.nextInt();
Student s1[]=new Student[n];
```

```
Internals si[]=new Internals[n];
Externals se[]=new Externals[n];
for(i=0;i<n;i++)
{
System.out.println("student details for student"+(i+1)+":");
s1[i]=new Student();
s1[i].student_details();
si[i]=new Internals();
si[i].internal_marks();
se[i]=new Externals();
se[i].external_marks();
s1[i].display();
System.out.println("total marks in 5 courses:");
for(j=0;j<5;j++)
{
total[j]=si[i].imarks[j]+se[i].emarks[j];
}
for(j=0;j<5;j++)
{
System.out.println(total[j]);
}
}
}
}
```

Output:




File Edit Selection View Go Run Terminal Help
Search
PROBLEMS 10 OUTPUT DEBUG CONSOLE TERMINAL PORTS
enter student external marks:
98
97
56
64
90
Student Name:vagisha
Student USN:1234
Student Semester:3
total marks in 5 courses:
132.0
136.0
89.0
97.0
130.0
student details for student2:
enter student details:
enter student name:
manjil
enter student USN:
5678
enter student semester:
3
enter student internal marks:
40
33
34
32
35
enter student external marks:
60
66
87
77
97
Student Name:manjil
Student USN:5678
Student Semester:3
total marks in 5 courses:
100.0
99.0
121.0
109.0
132.0
PS C:\Users\vagis\OneDrive\Desktop>

Lab Program 7

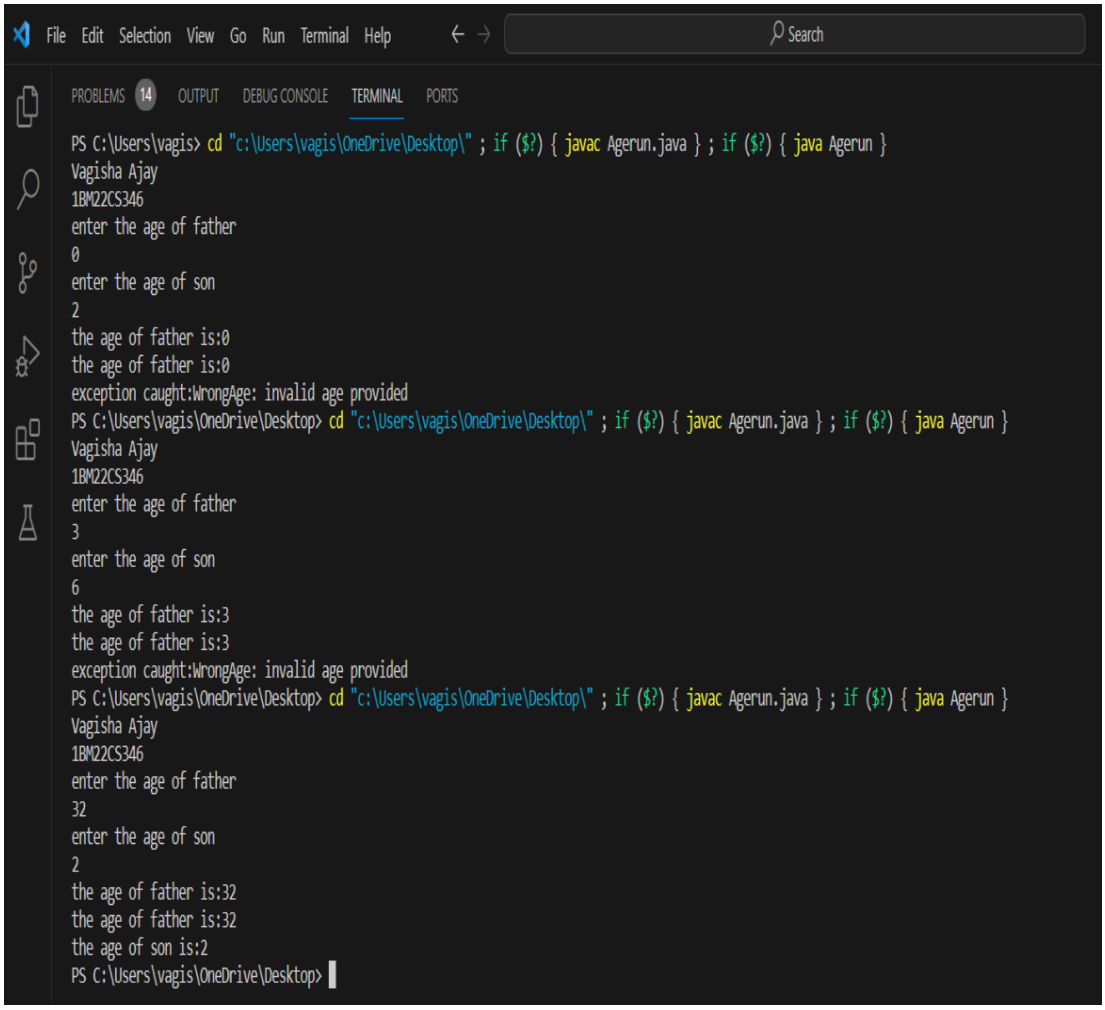
Write a program that demonstrates handling of exceptions in inheritance tree. Create a base class called “Father” and derived class called “Son” which extends the base class. In Father class, implement a constructor which takes the age and throws the exception WrongAge( ) when the input age<0. In Son class, implement a constructor that cases both father and son’s age and throws an exception if son’s age is >=father’s age.

Code:

```
import java.util.*;
class WrongAge extends Exception
{
public WrongAge()
{
super("invalid age provided");
}
}

class Father
{
int fage;
public Father(int fage) throws WrongAge
{
this.fage=fage;
if(fage<0)
{
throw new WrongAge();
}
else
{
System.out.println("the age of father is:"+fage);
}
}
}


class Son extends Father
{
int sage;
public Son(int fage,int sage) throws WrongAge
{
super(fage);
this.sage=sage;
```

```
if(sage>=fage)
{
throw new WrongAge();
}
else
{
System.out.println("the age of son is:"+sage);
}
}
}


class Agerun
{
public static void main(String args[])
{
   System.out.println("Vagisha Ajay");
   System.out.println("1BM22CS346");
Scanner s=new Scanner(System.in);
int fatherage,sonage;
System.out.println("enter the age of father");
fatherage=s.nextInt();
System.out.println("enter the age of son");
sonage=s.nextInt();
try
{
Father f=new Father(fatherage);
Son so=new Son(fatherage,sonage);
}
catch(WrongAge ae)
{
System.out.println("exception caught:"+ae);
}
}
}
```

Output:


File Edit Selection View Go Run Terminal Help
Search
PROBLEMS 14 OUTPUT DEBUG CONSOLE TERMINAL PORTS
PS C:\Users\vagis> cd "c:\Users\vagis\OneDrive\Desktop\" ; if ($?) { javac Agerun.java } ; if ($?) { java Agerun }
Vagisha Ajay
1BM22CS346
enter the age of father
0
enter the age of son
2
the age of father is:0
the age of father is:0
exception caught:WrongAge: invalid age provided
PS C:\Users\vagis\OneDrive\Desktop> cd "c:\Users\vagis\OneDrive\Desktop\" ; if ($?) { javac Agerun.java } ; if ($?) { java Agerun }
Vagisha Ajay
1BM22CS346
enter the age of father
3
enter the age of son
6
the age of father is:3
the age of father is:3
exception caught:WrongAge: invalid age provided
PS C:\Users\vagis\OneDrive\Desktop> cd "c:\Users\vagis\OneDrive\Desktop\" ; if ($?) { javac Agerun.java } ; if ($?) { java Agerun }
Vagisha Ajay
1BM22CS346
enter the age of father
32
enter the age of son
2
the age of father is:32
the age of father is:32
the age of son is:2
PS C:\Users\vagis\OneDrive\Desktop>

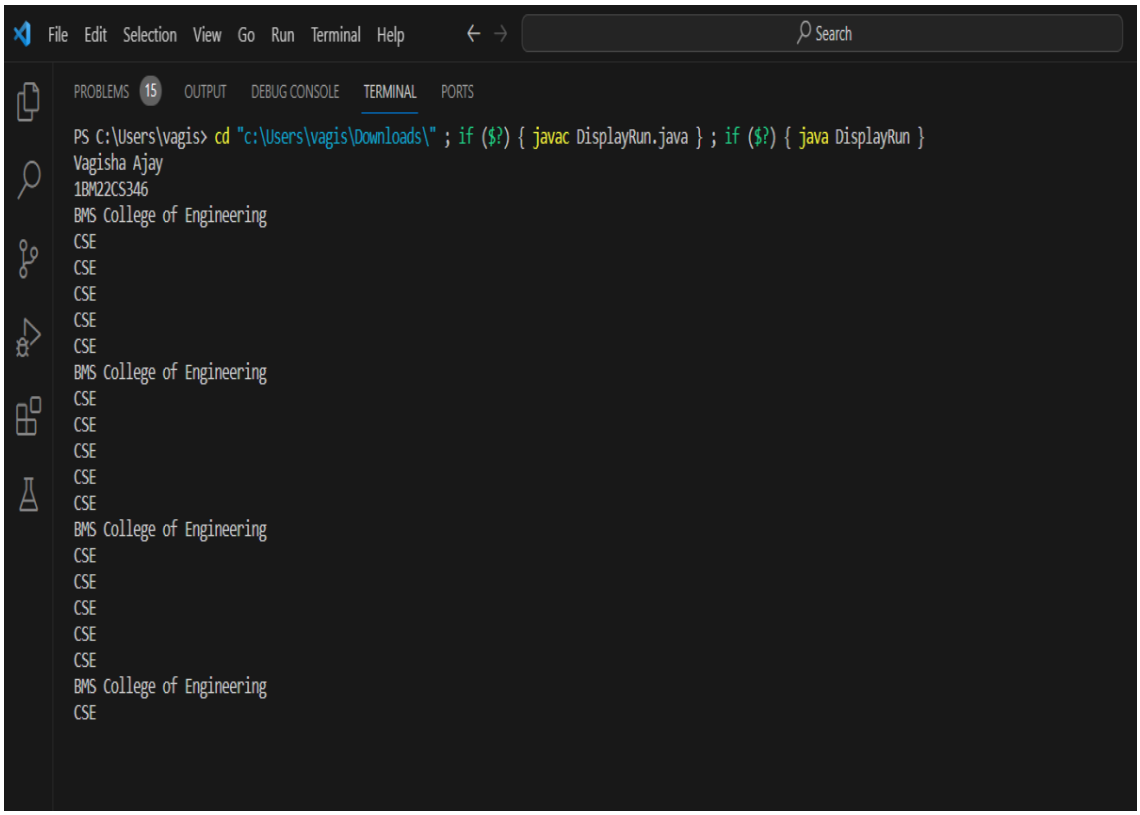
Lab Program 8

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.

Code:

```
class Display implements Runnable
{
String message;
int interval;
public Display(String message,int interval)
{
this.message=message;
this.interval=interval;
}
@Override
public void run()
{
try
{
while(true)
{
System.out.println(message);
Thread.sleep(interval);
}
}
catch(InterruptedException e)
{
System.out.println(e);
}
}
}

class DisplayRun
{
public static void main(String args[])
{
   System.out.println("Vagisha Ajay");
   System.out.println("1BM22CS346");
Thread t1=new Thread(new Display("BMS College of Engineering",10000));
t1.start();
Thread t2=new Thread(new Display("CSE",2000));
t2.start();
}
}
```

Output:



THANK YOU