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 b2-4ac is negative, display a message stating that there are no real solutions.

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1)

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

class Quadraticequation
{
  public static void main(String[] args)
  {
    int a,b,c;
    double d, r1, r2;
    Scanner sc = new Scanner (System.in);
    System.out.println ("Enter a,b,c:");
    a = sc.nextInt();
    b = sc.nextInt();
    c = sc.nextInt();

    d = b*b - 4*a*c;
    if(d>0)
    {
      System.out.println("Roots are real and unequal");
      r1 = (-1*b + Math.sqrt(d))/(2*a);
      r2 = (-1*b - Math.sqrt(d))/(2*a);
      System.out.printf("root1 = %.2f root2 = %.2f", r1, r2);
    }
  else if(d==0)
  {
```

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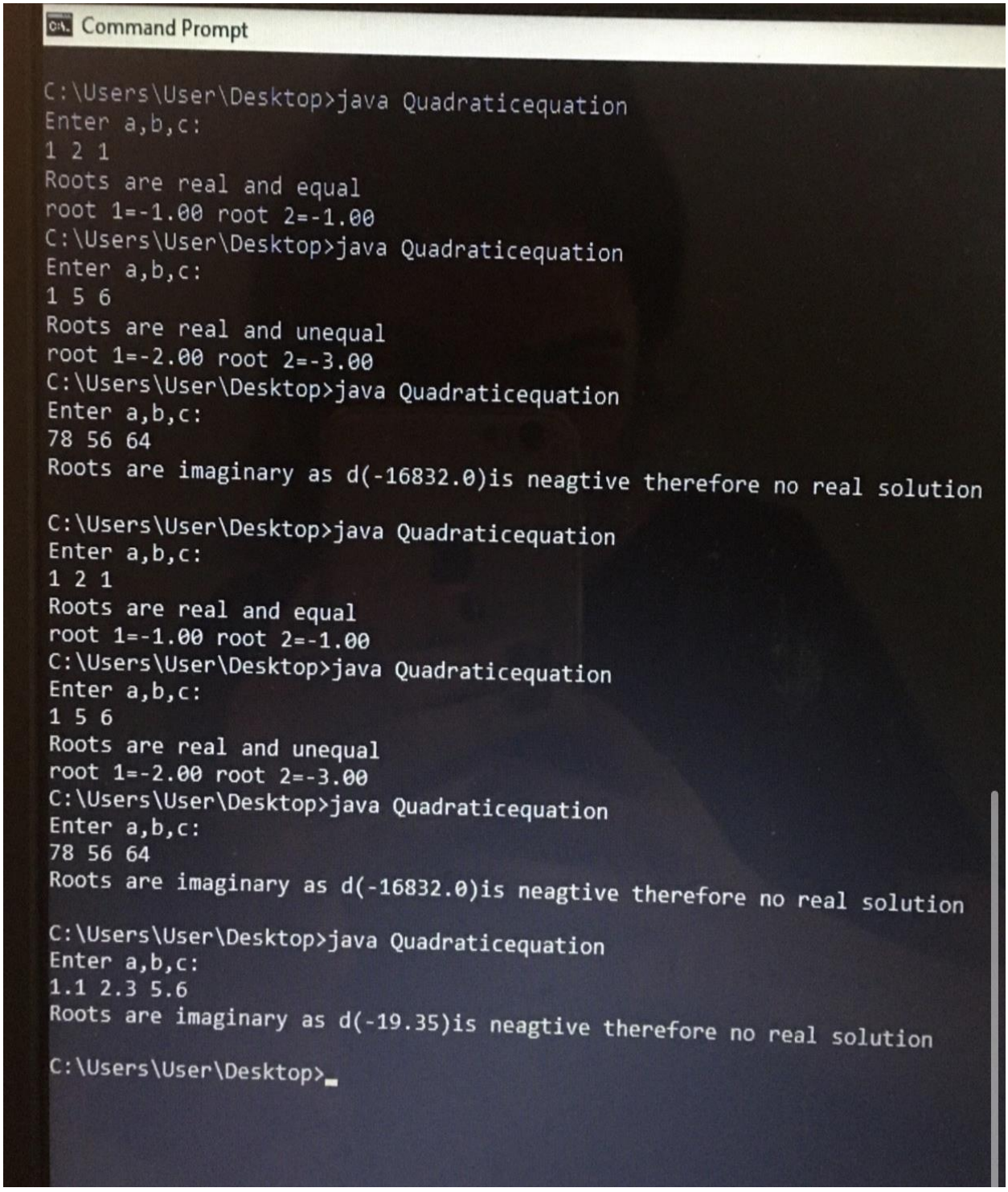
```
else
{
    System.out.println("Roots are imaginary
        as d("+d+")"+" is negative therefore
        no real solution");
}
}
}
```



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.

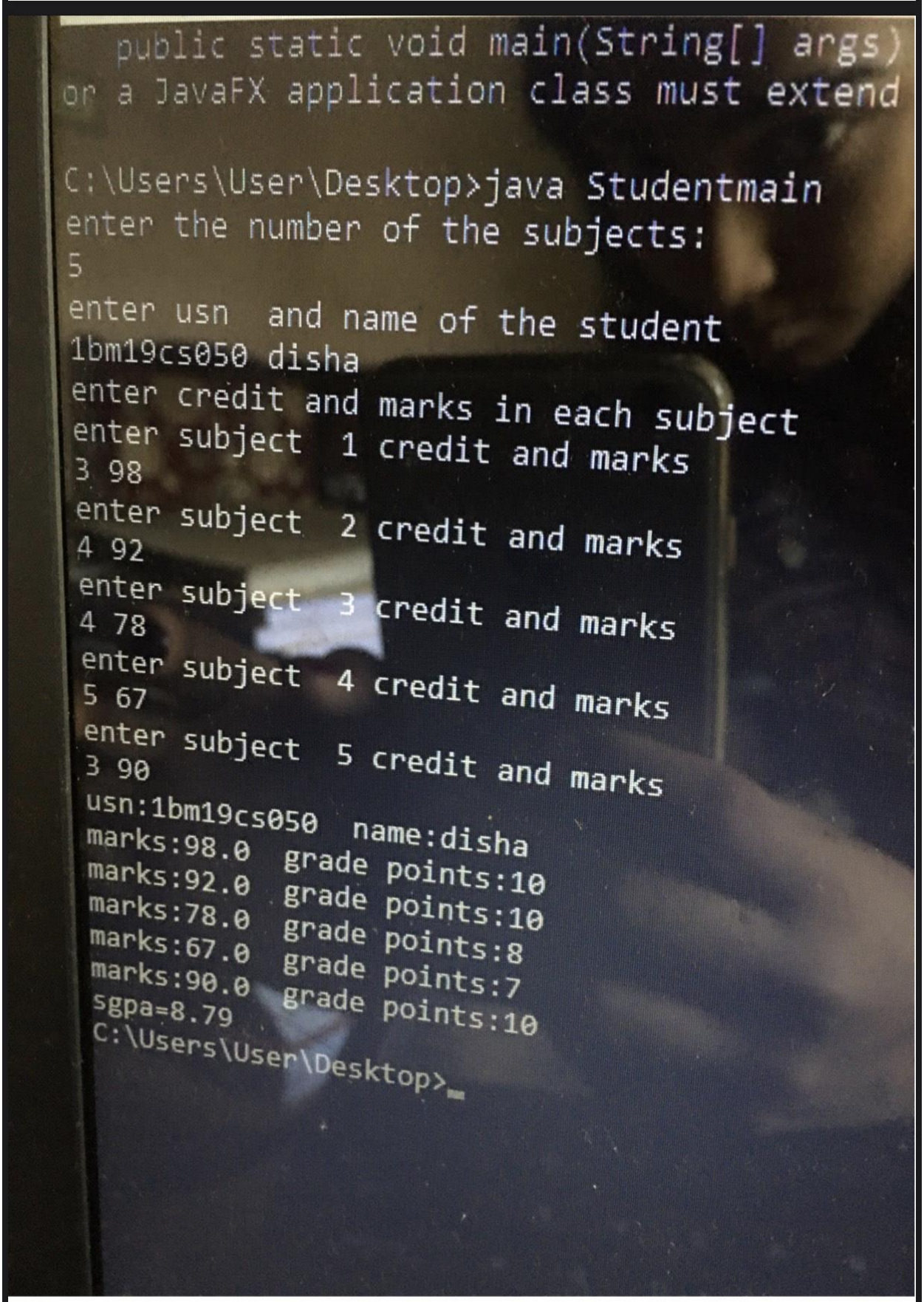
lab 2:

```
1) import java.util.*;
   class Student
   {
      private int n, credit[], gp[];
      private String name, usn;
      double sum, sgpa, marks[];
      Student()
      {
         name = " ";
         usn = " ";
      }
      void accept()
      {
         Scanner sc = new Scanner(System.in);
         System.out.println("Enter the number of
                              subjects:");
         n = sc.nextInt();
         credit = new int[n+1];
         marks = new double[n+1];
         System.out.println("enter usn and name of
                              student");
         usn = sc.next();
         name = sc.next();

         System.out.println("enter credit and marks
```

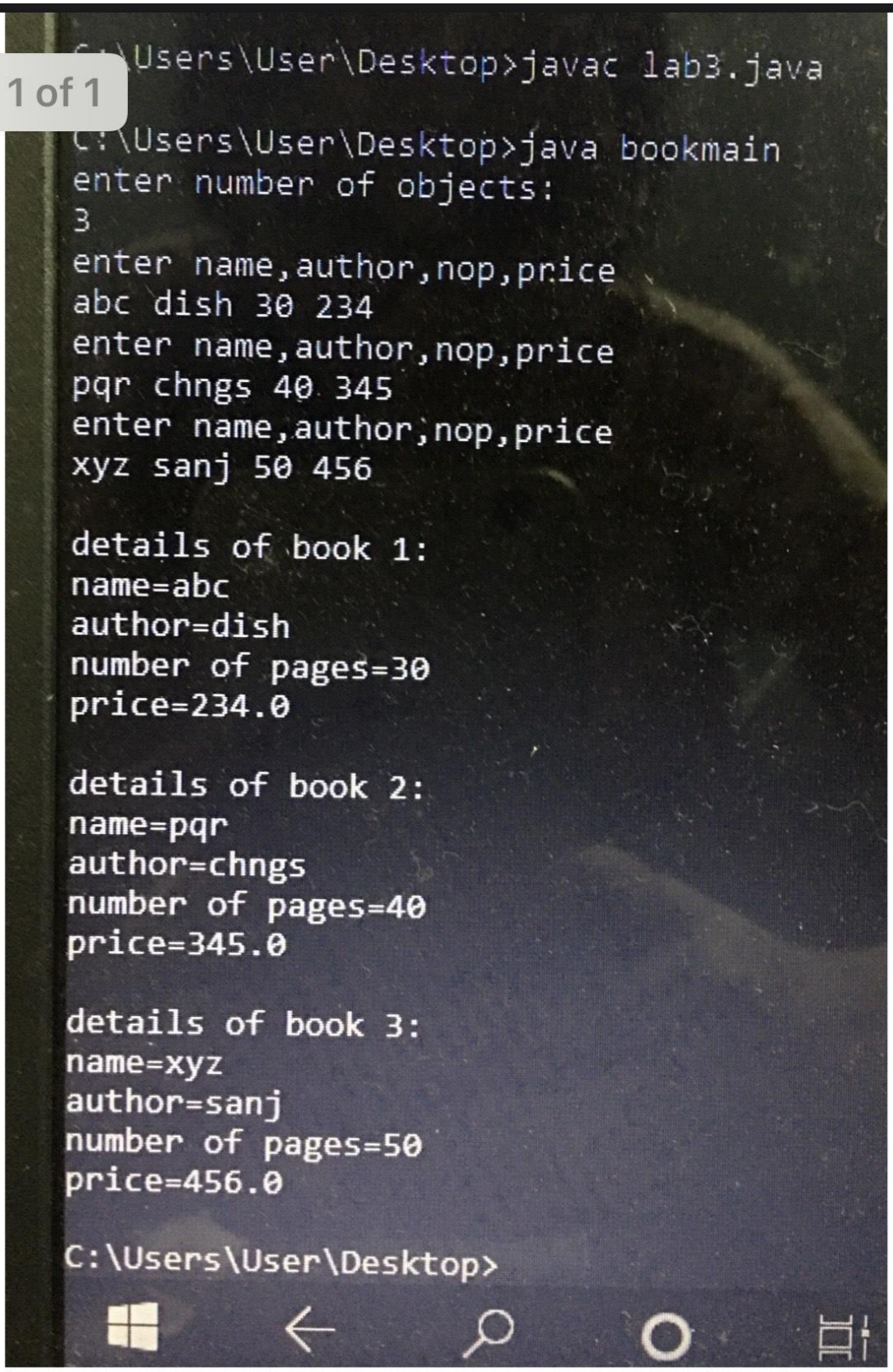
```
        credit[i] = sc.nextInt();
        marks[i] = sc.nextDouble();
    }
}
void calculate()
{
    gp = new int[n+1];
    int cr=0;
    for(int i=1; i<=n; i++)
    {
        if(marks[i]>=90)
            gp[i]=10;
        else if(marks[i]>=80 && marks[i]<90)
            gp[i]=9;
        else if(marks[i]>=70 && marks[i]<80)
            gp[i]=8;
        else if(marks[i]>=60 && marks[i]<70)
            gp[i]=7;
        else if(marks[i]>=50 && marks[i]<60)
            gp[i]=5;
        else if(marks[i]<50
            gp[i]=0;
        sum=(double)(credit[i]*gp[i])+sum;
        cr=cr+credit[i];
    }
```

```
{
    System.out.println("usn:"+usn+"name:"+name);
    for(int i=1;i<=n;i++)
    System.out.println("marks:"+marks[i]+"
                        grade points:"+gp[i]);
    System.out.printf("sgpa=%.2f",sgpa);
  }
}
class Studentmain
{
    public static void main(String[] args).
    {
        Student s1= new Student();
        s1.accept();
        s1.calculate();
        s1.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.

```
}
class bookmain
{
    public static void main(String[] args)
    {
        int n;
        Scanner sc= new Scanner(System.in);
        System.out.println("enter no. of objects:");
        n=sc.nextInt();
        book b[]= new book[n];
        for(int i=0; i<n;i++)
        {
            b[i]= new book();
            b[i].accept();
        }
        for(int i=0; i<n; i++)
        {
          System.out.println("\n details of
          book "+(i+1)+":");
          System.out.println(b[i]);
        }
    }
}
```



```
C:\Users\User\Desktop>javac lab3.java

C:\Users\User\Desktop>java bookmain
enter number of objects:
3
enter name,author,nop,price
abc dish 30 234
enter name,author,nop,price
pqr chngs 40 345
enter name,author,nop,price
xyz sanj 50 456

details of book 1:
name=abc
author=dish
number of pages=30
price=234.0

details of book 2:
name=pqr
author=chngs
number of pages=40
price=345.0

details of book 3:
name=xyz
author=sanj
number of pages=50
price=456.0

C:\Users\User\Desktop>
```

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.

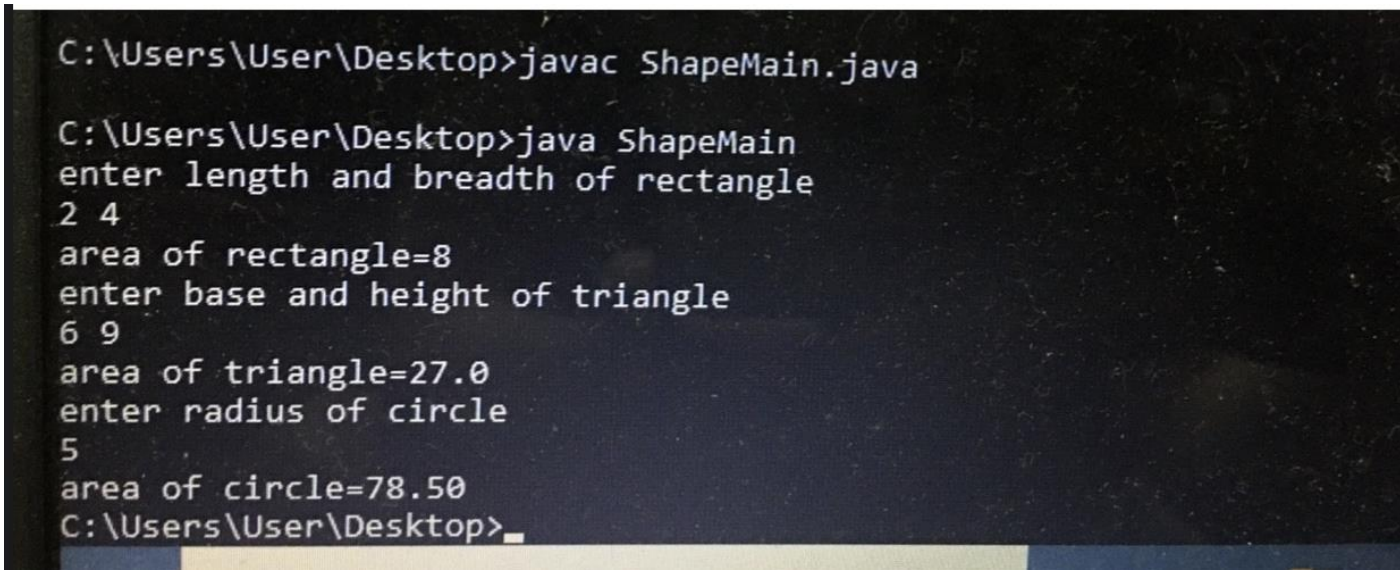
exercise:

```
import java.util.Scanner;
abstract class shape
{
   int a, b;
   abstract public void print_area();

}
class rectangle extends shape
{
 Scanner sc = new Scanner(System.in);
 public int area_rect;
 public void print_area()
 {
  System.out.println("enter a and b");
  a = sc.nextInt();
  b = sc.nextInt();
  area_rect = a*b;
  System.out.println("The area of rectangle
      is :"+area_rect);
 }

}
class triangle extends shape
 {
   int area_tri;
   Scanner sc = new Scanner(System.in);
   public void print_area()
   {
    System.out.println("enter a and b:");
   a = sc.nextInt();
```

```
        b = sc.nextInt();
        area_tri = (int)(0.5*a*b);
        System.out.println("The area of the triangle
        is :"+area_tri);
    }
}
class circle extends Shape
{
    int area_circle;
    Scanner sc=new Scanner(System.in);
    public void printarea()
    {
        System.out.println("enter a and b:");
        a = sc.nextInt();
        b = sc.nextInt();
        area_circle = (int) (3.14*a*a);
        System.out.println("The area of circle
        is :"+area_circle);
    }
}
public class shapearea
{
    public static void main(String[] args)
    {
        rectangle r= new rectangle();
        r.print_area();
        triangle t = new triangle();
        t.print_area();
        circle r1 = new circle();
        r1.print_area();
    }
}
```



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.

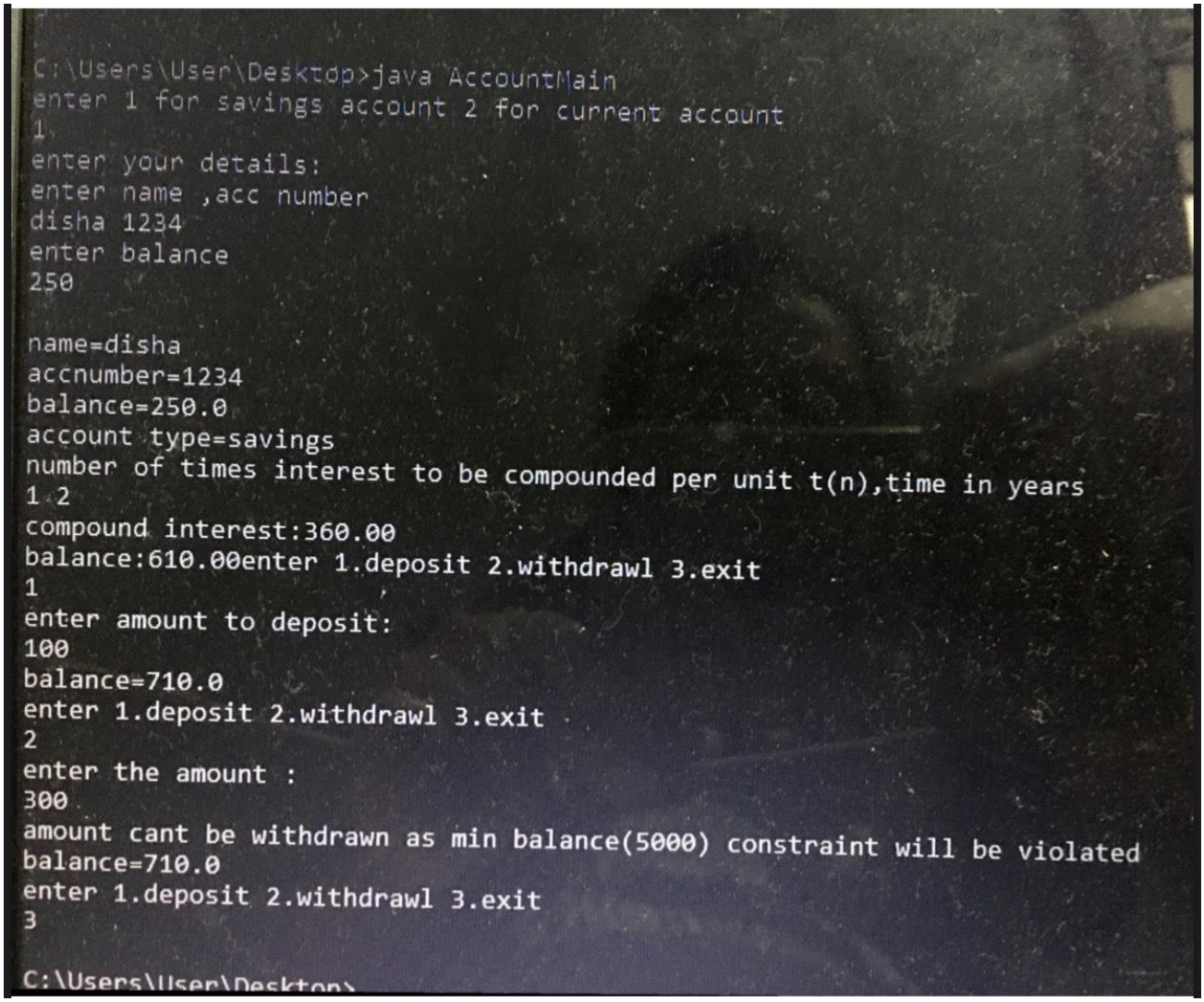
```
import java.util.Scanner;
class account
{
  String name, accnum, acctype;
  double balance;
  account() { }
  /* {
      if (a==1)
          acctype="savings";
       elseif (a==2)
          acctype="current";
    } */
  void input()
  {
    Scanner sc = new Scanner(System.in);
    System.out.println("enter name, acc number");
    name=sc.next();
    accnum = sc.next();
    System.out.println("enter balance");
    balance = sc.nextInt();
  }
  void displaydetails()
  {
    System.out.println("\nname="+name+"\naccnumber
        ="+accnum+"\nbalance="+balance+
      "\naccount type="+acctype);
  }
void display()
{
System.out.println("balance="+balance);
```

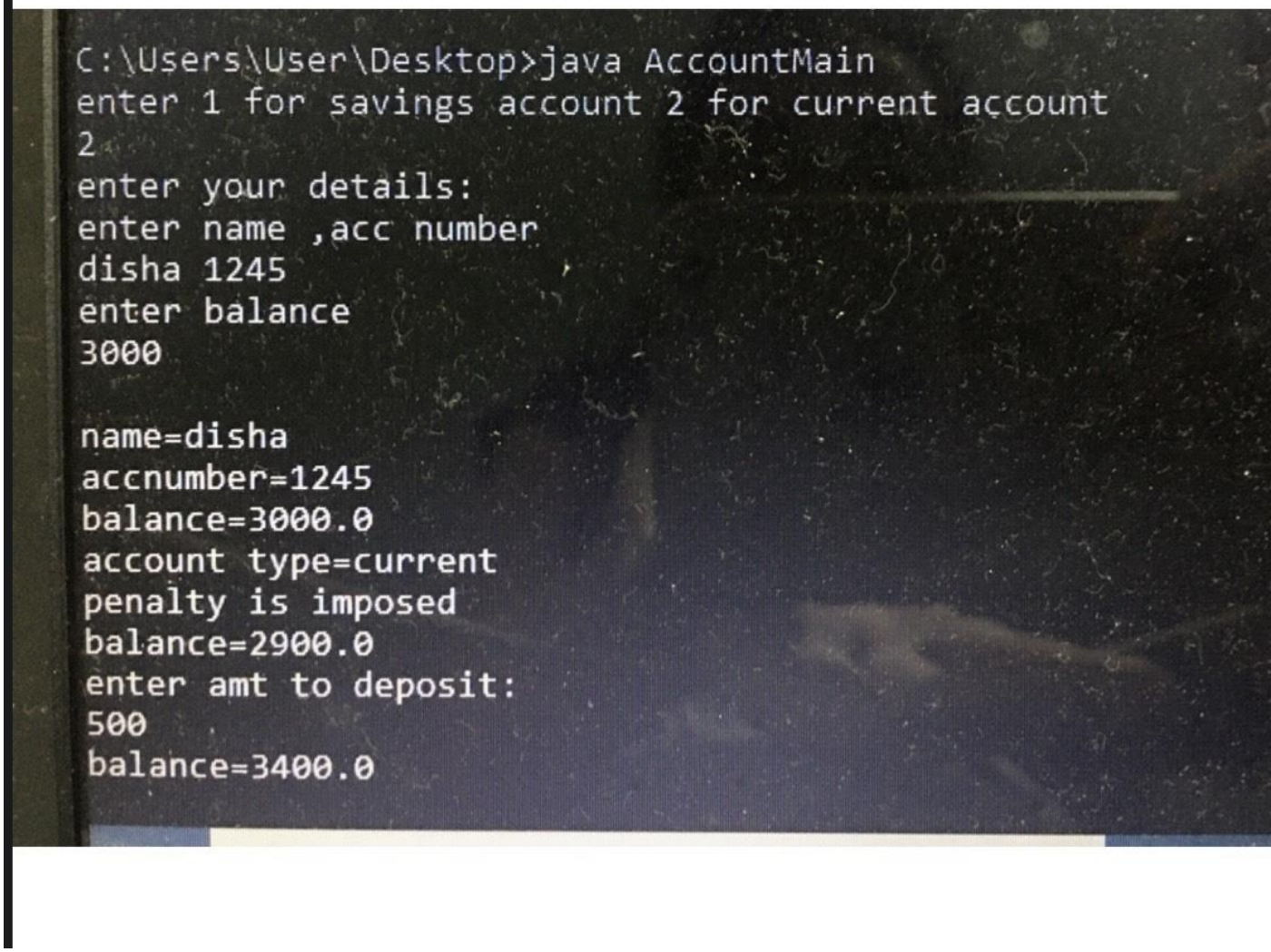
```
}
class currAcct extends Account
{
  currAcct()
   { acctype = "current";
   }
    double minbal = 5000;
   void check()
   { double penalty = 100;
    if (balance < minbal)
     { balance = balance - penalty;
       System.out.println("penalty is imposed");
    System.out.println("balance = " +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

```
savacc()
{
  acctype1="savings";
}
double ci;
void calcompound(int n, int t)
{
  ci=balance*(Math.pow(1+(0.2/n)),(n*t)));
  balance = balance+ ci;
  System.out.printf("compound interest:%.2f",ci);
  System.out.printf("\n balance:%.2f", balance);
}
void withdrawal(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;
}
void deposit()
{
System.out.println("enter amount to deposit");
Scanner sc = new Scanner(System.in);
double depamt;
depamt = sc.nextDouble();
balance= balance+depamt;
```

```
        System.out.println("balance="+balance);
    }
}
class AccountMain
{
public static void main(String[] args)
    {
        Scanner sc=new Scanner(System.in);
        //Account A=new Account();
        System.out.println("enter 1 for savings
            account, 2 for current account");
        int acctype=sc.nextInt();
        savacc s=new savacc();
        currarct c=new currarct();
        if(acctype==1)
        {
            System.out.print("enter your details:");
            s.input();
            s.displaydetails();
            System.out.println("number of times
                interest to be compounded per unit
                t(u), time in years");
            int n=sc.nextInt();
            int t=sc.nextInt();
            sc.calcompound(n,t);
            int n1=1;
            while(n1==1)
            {
            System.out.println("enter 1.
                deposit 2. withdrawal 3. exit");
```

```
int w = sc.nextInt();
if(w==1)
{
 s.deposit();
}
else if(w==2)
{
 System.out.println("enter the amount:");
 double amt= sc.nextDouble();
 s.withdrawal(amt);
 s.display();
}
else
{
 System.exit(0);
}
}
}
else if(acctype==2)
{
 System.out.println("enter your details");
 c.input();
 c.displaydetails();
 c.check();
 c.deposit();
 c.display();
}
}
}
```


C:\Users\User\Desktop>java AccountMain
enter 1 for savings account 2 for current account
1
enter your details:
enter name ,acc number
disha 1234
enter balance
250
name=disha
accnumber=1234
balance=250.0
account type=savings
number of times interest to be compounded per unit t(n),time in years
1 2
compound interest:360.00
balance:610.00enter 1.deposit 2.withdrawl 3.exit
1
enter amount to deposit:
100
balance=710.0
enter 1.deposit 2.withdrawl 3.exit
2
enter the amount :
300
amount cant be withdrawn as min balance(5000) constraint will be violated
balance=710.0
enter 1.deposit 2.withdrawl 3.exit
3
C:\Users\User\Desktop>



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.

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```
package CIE;
import java.util.*;
public class Internals extends student
{
    public int a[];
    public void input()
    {
        Scanner sc = new Scanner (System.in);
        System.out.println("enter cie marks (5
            subjects) out of 50");
        a = new int[5];
        for(int i=0; i<5; i++)
        a[i] = sc.nextInt();
    }
}
```

```
package CIE;
import java.util.*;
public class student
{
    public String usn, name;
    public int sem;
    public void inputd()
    {
        Scanner sc = new Scanner (System.in);
        System.out.println("enter usn, name, sem");
        usn = sc.next();
        name = sc.next();
```

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```
        sem = sc.nextInt();
    }
    public void display()
    {
        System.out.println("usn = "+usn+"name = "
            +name+" sem = "+sem);
    }
}
package SEE;
import CIE.*;
import java.util.*;
public class externals extends CIE.student
{
    public int a[];
    public void input()
    {
        Scanner sc = new Scanner (System.in);
        System.out.println("enter see marks(5
            subjects) out of 100 ");
        a = new int[5];
        for(int i=0; i<5; i++)
        a[i] = sc.nextInt();
    }
}
```

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```
import CIE.*;
import SEE.*;
import java.util;
class total
{
  public static void main (String[] args)
  {
    //CIE.student s= new CIE.student();//
    Scanner sc=new Scanner (System.in);
    System.out.println("enter number of
        students");
    int n = sc.nextInt();
    CIE.internals in[]= new CIE.internals[n];
    SEE.externals ex[]=new SEE.externals[n];
    int total;
    for(int j=0;j<n;j++)
    {
      System.out.println("enter"+(j+1)+"
          student details:");
      in[j]=new CIE.internals();
      ex[j]= new SEE.externals();
      in[j].inputd();
      in[j].input();
      ex[j].input();
    }
  System.out.println(" ");
  for(int j=0; j<n; j++){
  {
```


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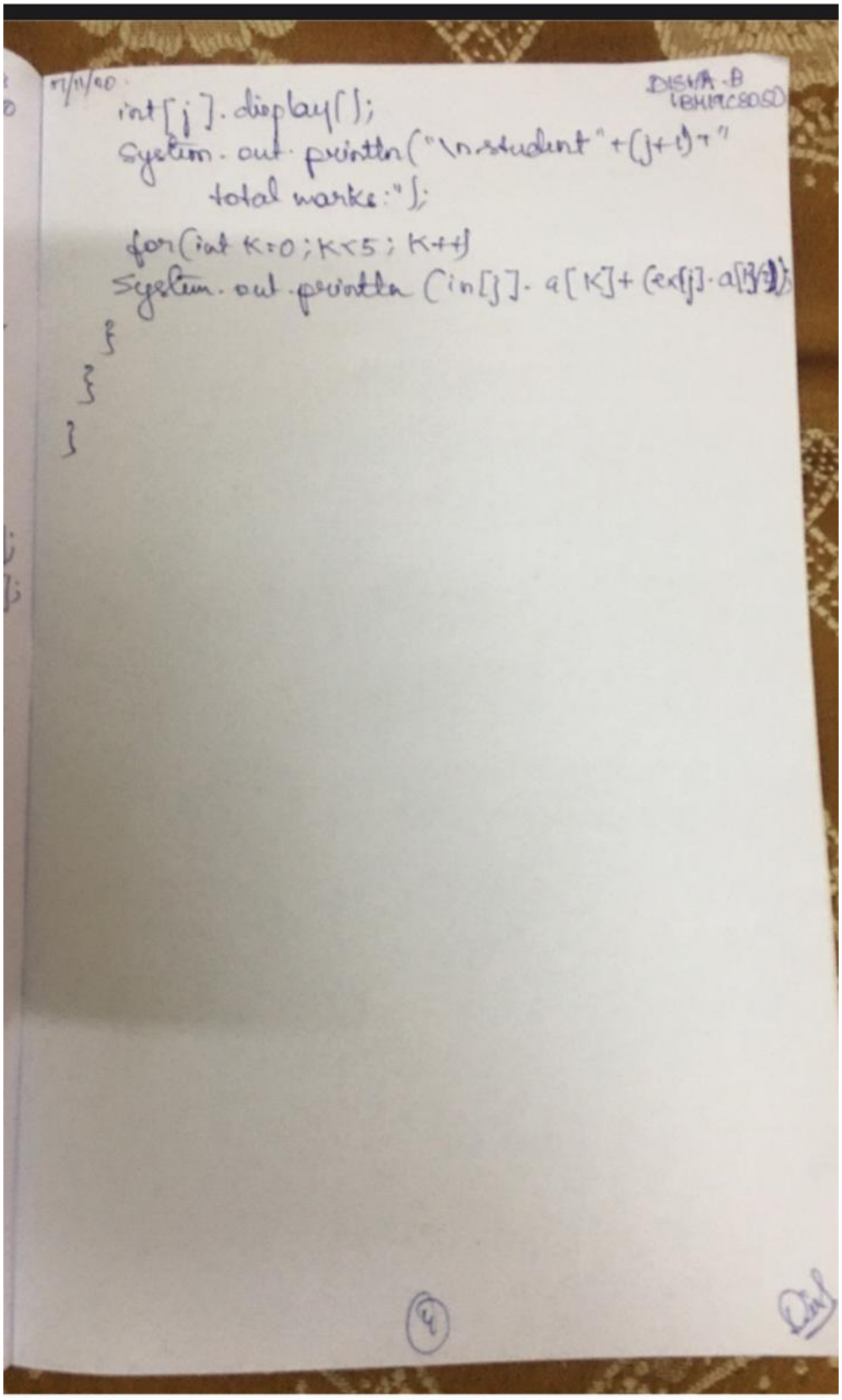

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```
int[j].display();
System.out.println("\n student"+(j+1)+"
    total marks:");
for(int K=0;K<5;K++)
System.out.println(in[j].a[K]+(ex[j].a[K]/2));
}
}
}
```

4

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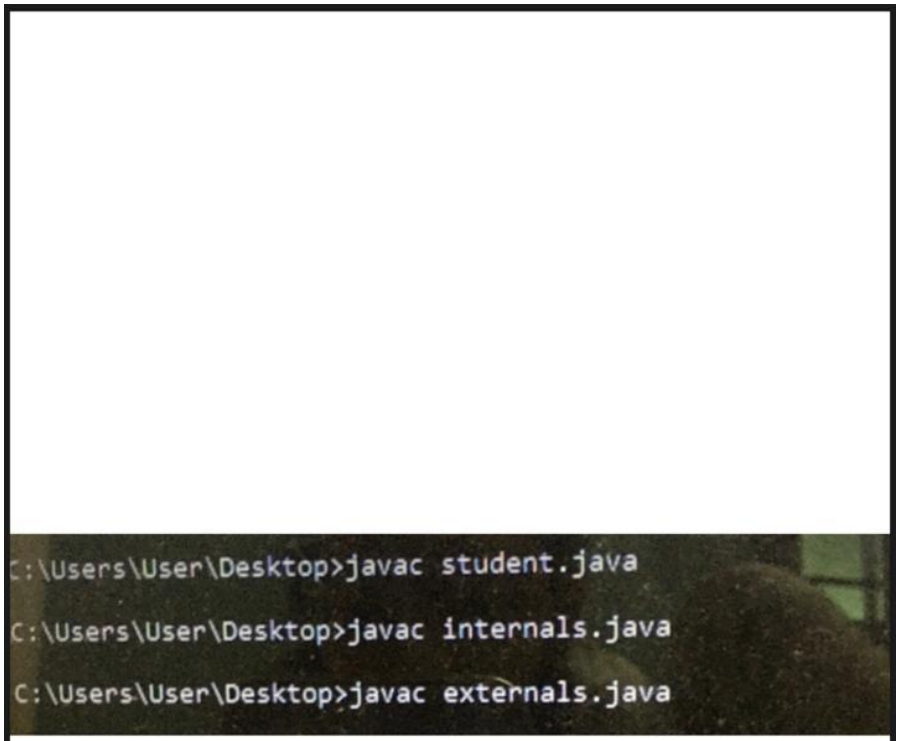
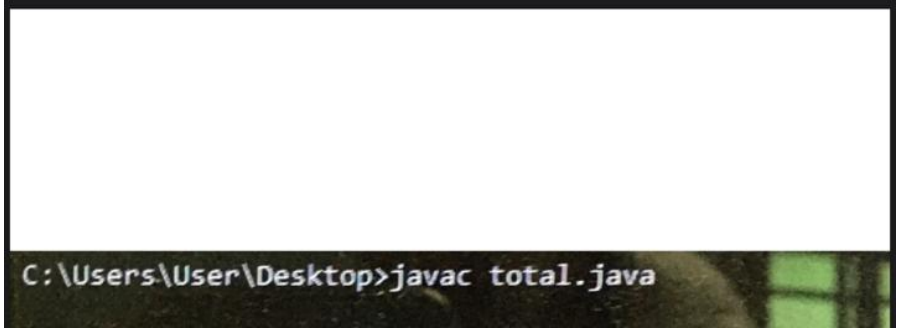
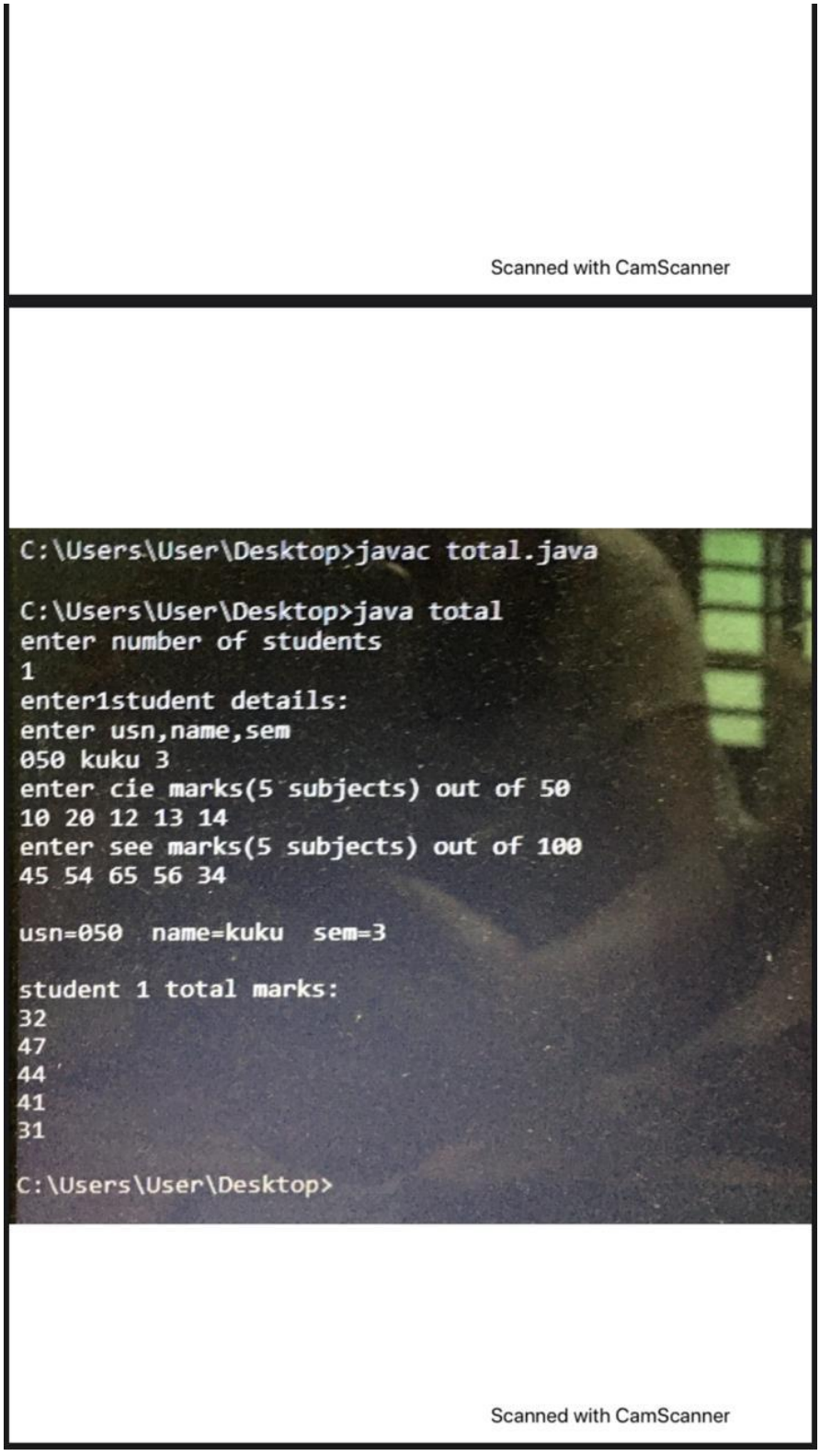
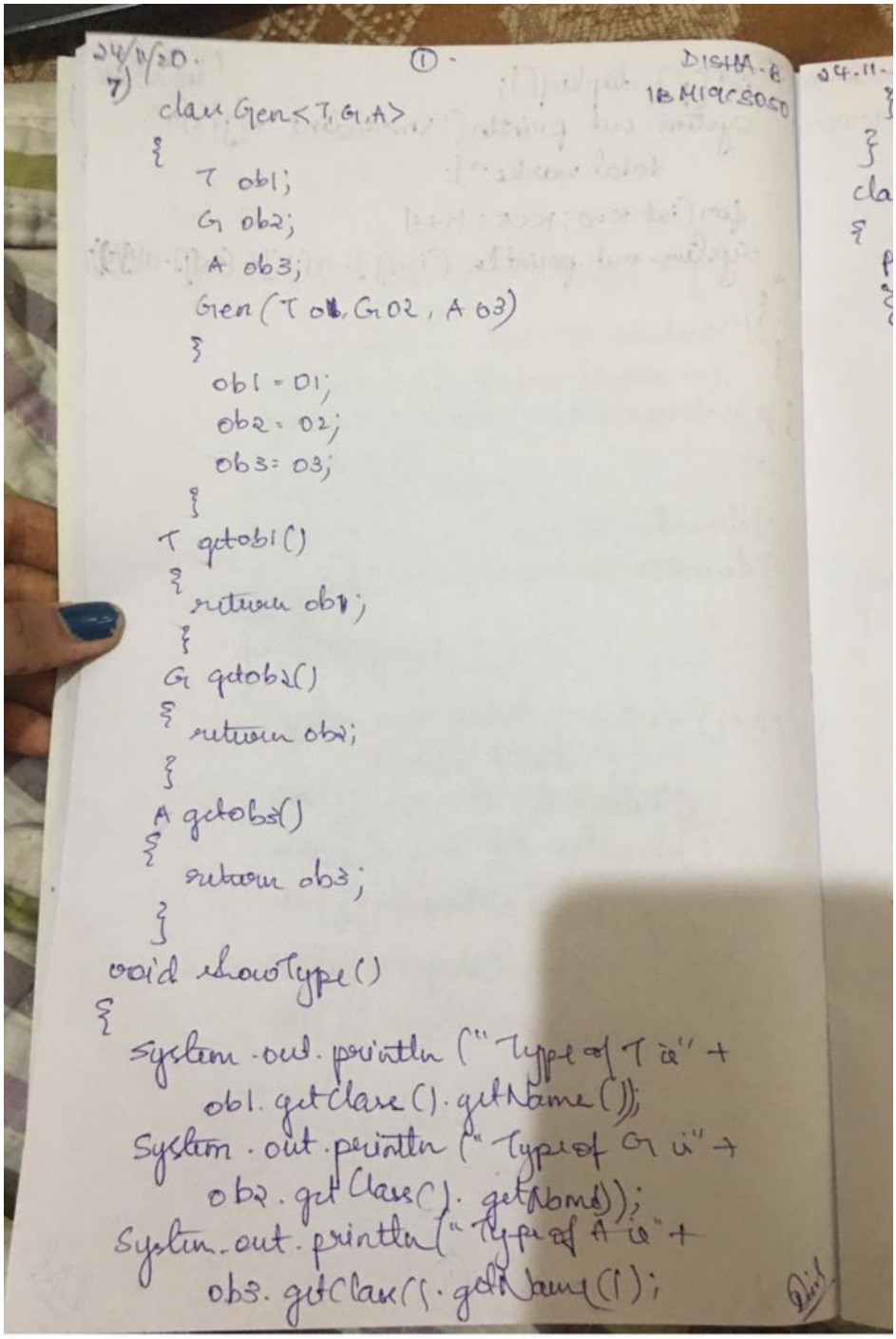






7. Write a program to demonstrate generics with multiple object parameters.



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7)
```
class Gen<T,G,A>
{
   T ob1;
   G ob2;
   A ob3;
   Gen(T o1, G o2, A o3)
   {
     ob1 = o1;
     ob2 = o2;
     ob3 = o3;
   }
  T getob1()
   {
    return ob1;
   }
  G getob2()
  {
   return ob2;
  }
 A getob3()
 {
   return ob3;
 }
void showType()
{
 System.out.println("Type of T is" +
     ob1.getClass().getName());
 System.out.println("Type of G is" +
     ob2.getClass().getName());
System.out.println("Type of A is" +
     ob3.getClass().getName());
```

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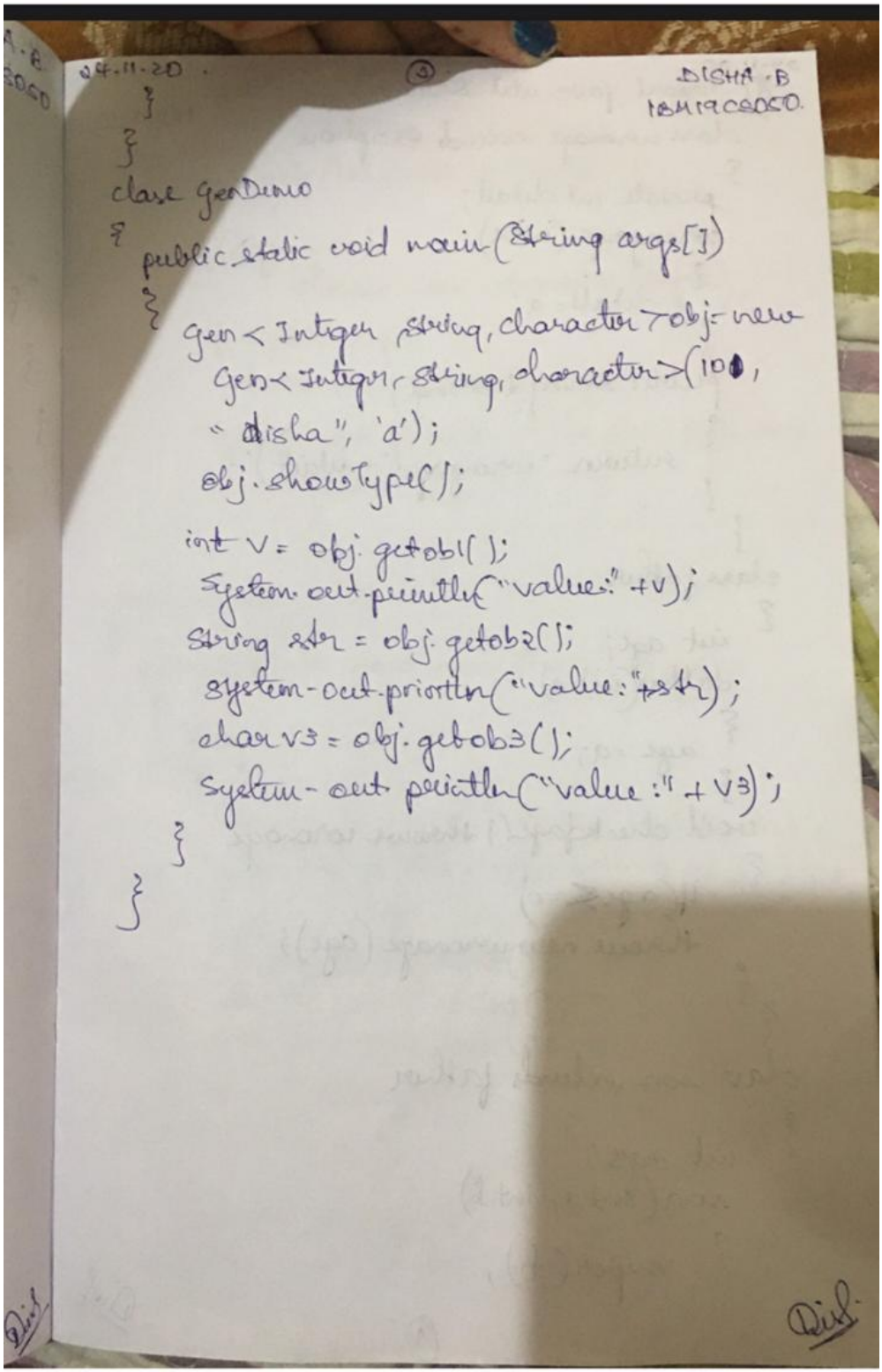

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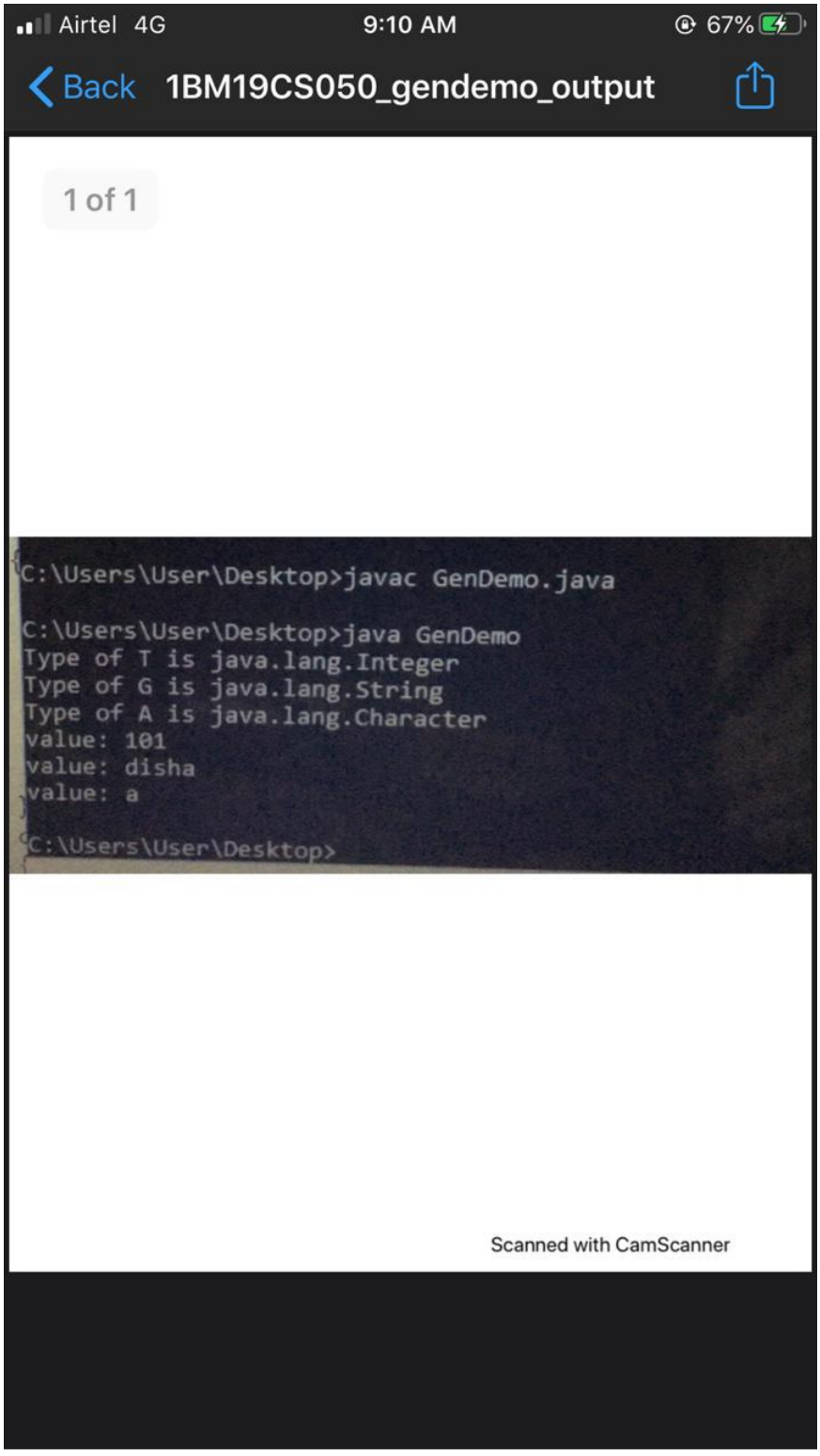
```
    }
  }
class GenDemo
{
  public static void main(String args[])
  {
    Gen<Integer, String, character> obj = new
      Gen<Integer, String, character>(100,
      "disha", 'a');
    obj.showType();

    int V = obj.getob1();
     System.out.println("value:" +v);
    String str = obj.getob2();
     system.out.println("value:"+str);
     char v3 = obj.getob3();
     System.out.println("value :" + V3);
  }
}
```

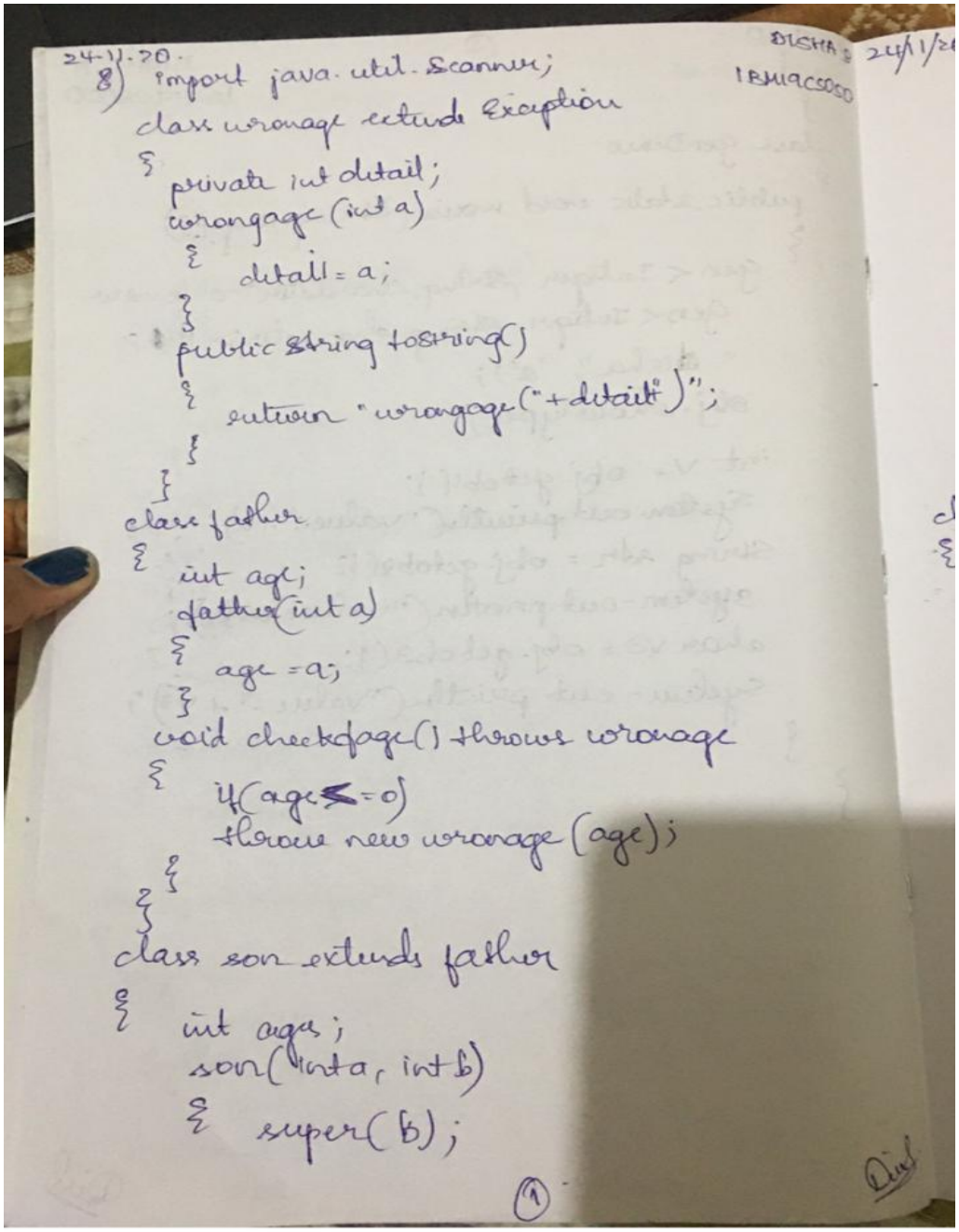


8. Write a program that demonstrates handling of exceptions in inheritance tree. Create a base class

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.



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8) import java.util.Scanner;

```
class wrongage extends Exception
{
  private int detail;
  wrongage(int a)
   {
     detail = a;
   }
  public String toString()
   {
     return "wrongage("+detail+")";
   }
}
class father
{
  int age;
  father(int a)
  {
    age = a;
  }
  void checkage() throws wrongage
  {
     if(age<=0)
     throw new wrongage(age);
  {
}
class son extends father
{
  int ages;
  son(int a, int b)
  { super(b);
```

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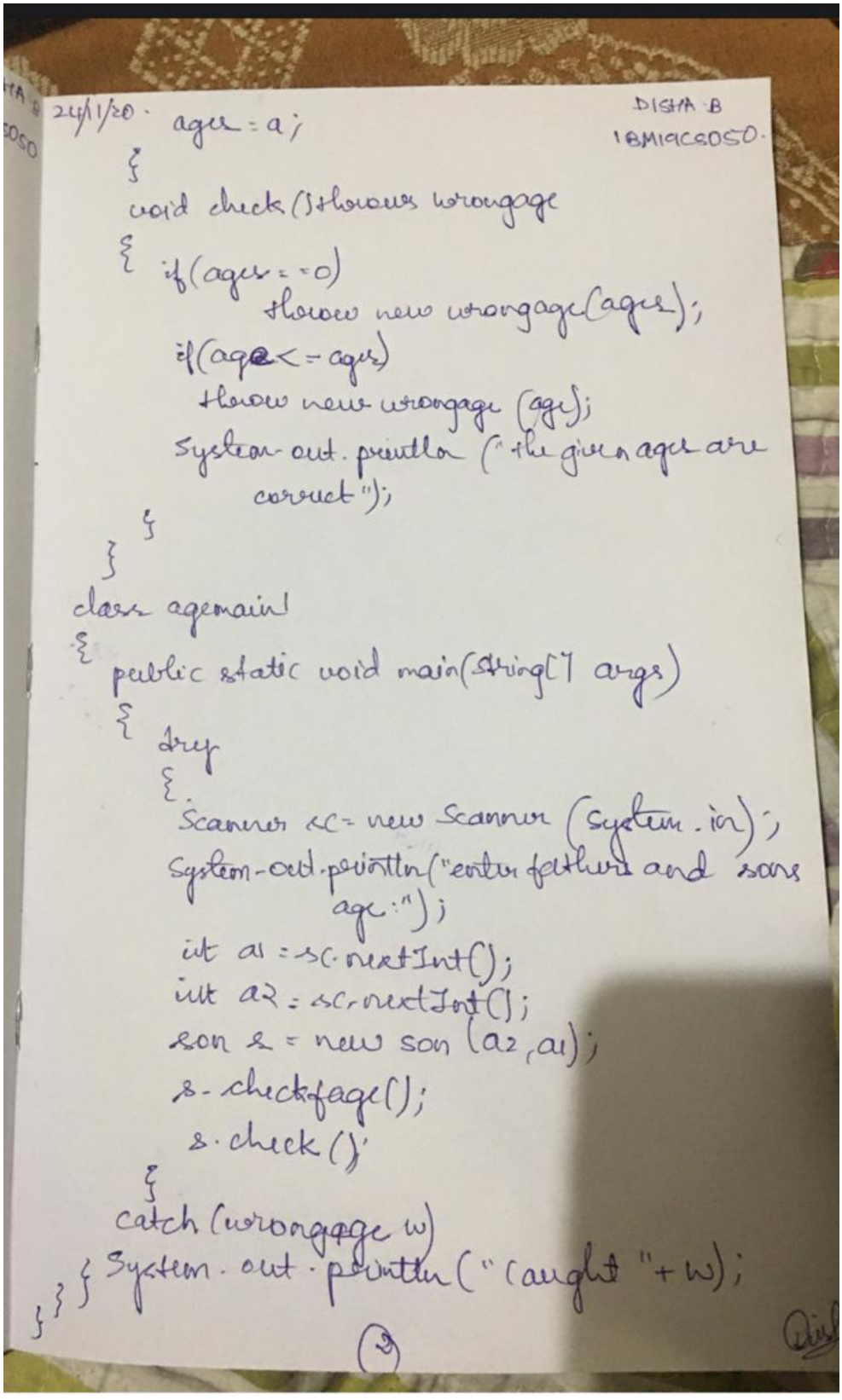

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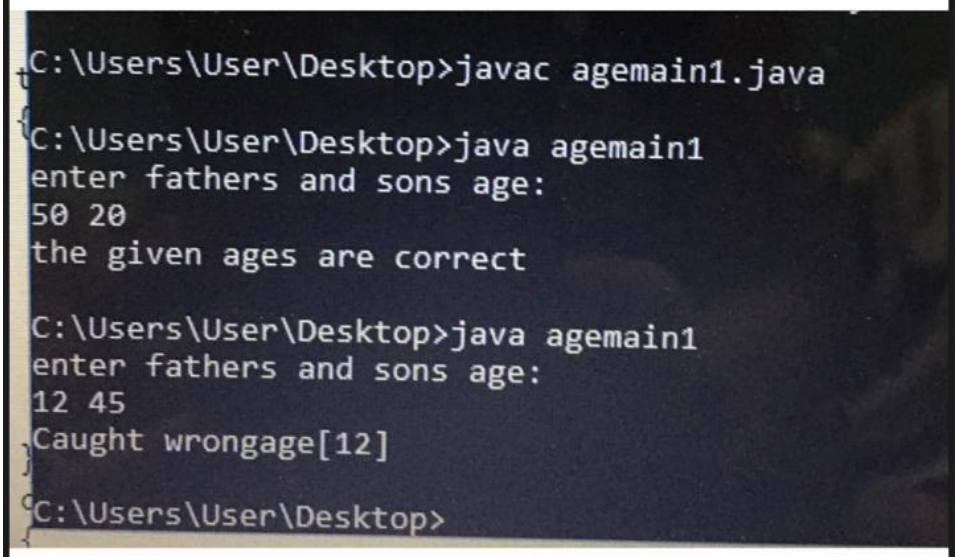
```
age = a;
}
void check() throws wrongage
{ if(age == 0)
        throw new wrongage(age);
  if(age <= age)
    throw new wrongage (age);
  System.out.println ("the given age are
      correct");
}
}
class agemain1
{
public static void main(String[] args)
{ try
  {
   Scanner sc = new Scanner (System.in);
   System.out.println("enter fathers and sons
              age:");
   int a1 = sc.nextInt();
   int a2 = sc.nextInt();
   son s = new son (a2, a1);
   s.checkfage();
   s.check();
  }
 catch (wrongage w)
{ System.out.println ("caught "+w);
}}}
```

(3)



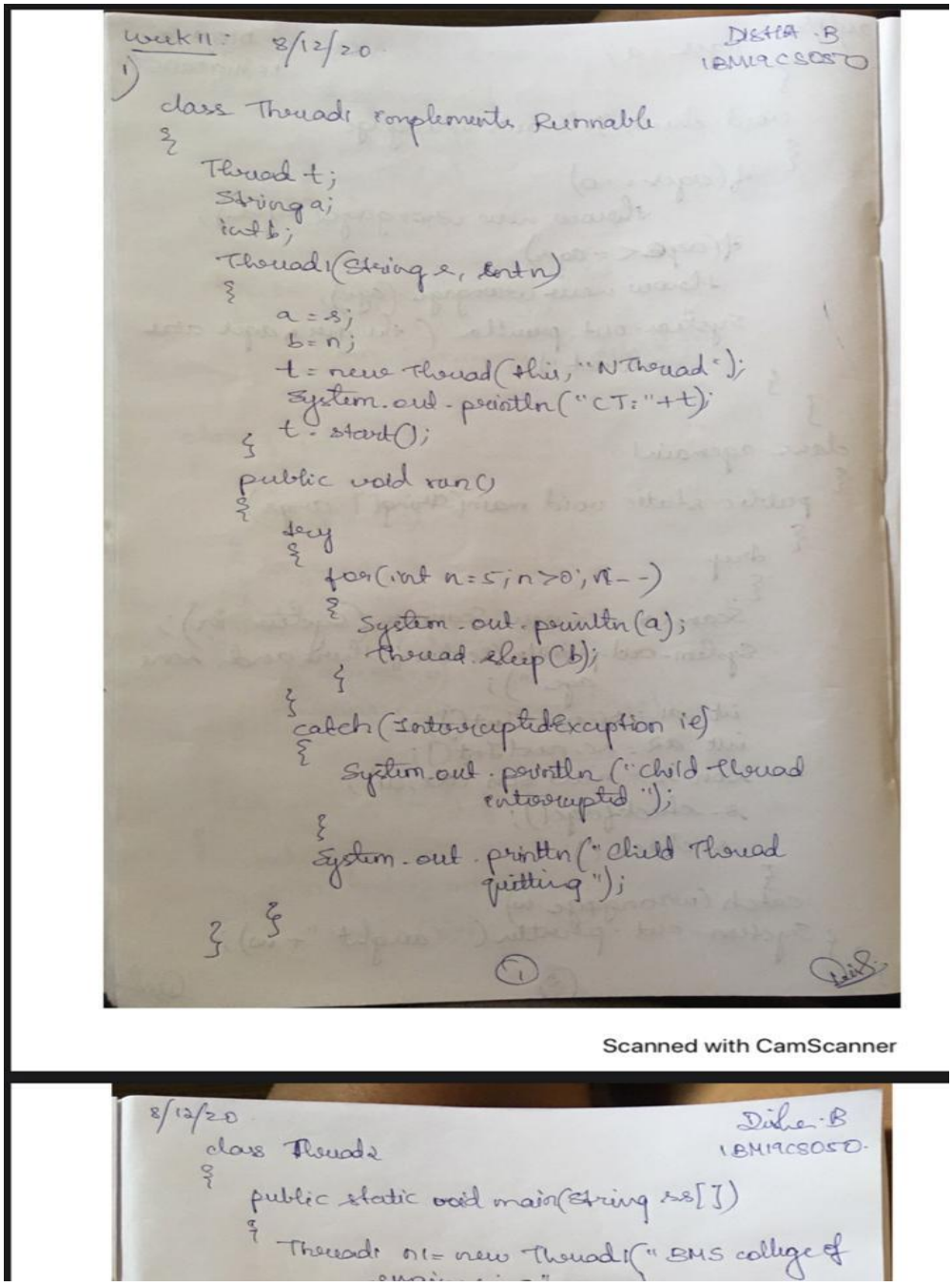
```
C:\Users\User\Desktop>javac agemain1.java

C:\Users\User\Desktop>java agemain1
enter fathers and sons age:
50 20
the given ages are correct

C:\Users\User\Desktop>java agemain1
enter fathers and sons age:
12 45
Caught wrongage[12]

C:\Users\User\Desktop>
```

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.



Week 11 : 8/12/20

Disha B
1BM19CS050

1)

```
class Thread1 implements Runnable
{
    Thread t;
    String a;
    int b;
    Thread1(String s, int n)
    {
        a = s;
        b = n;
        t = new Thread(this, "NThread");
        System.out.println("CT:"+t);
        t.start();
    }
    public void run()
    {
        try
        {
            for(int n=5; n>0; n--)
            {
                System.out.println(a);
                Thread.sleep(b);
            }
        }
        catch(InterruptedException ie)
        {
            System.out.println("child thread
                interrupted");
        }
        System.out.println("child Thread
            quitting");
    }
}
```

Scanned with CamScanner

8/12/20

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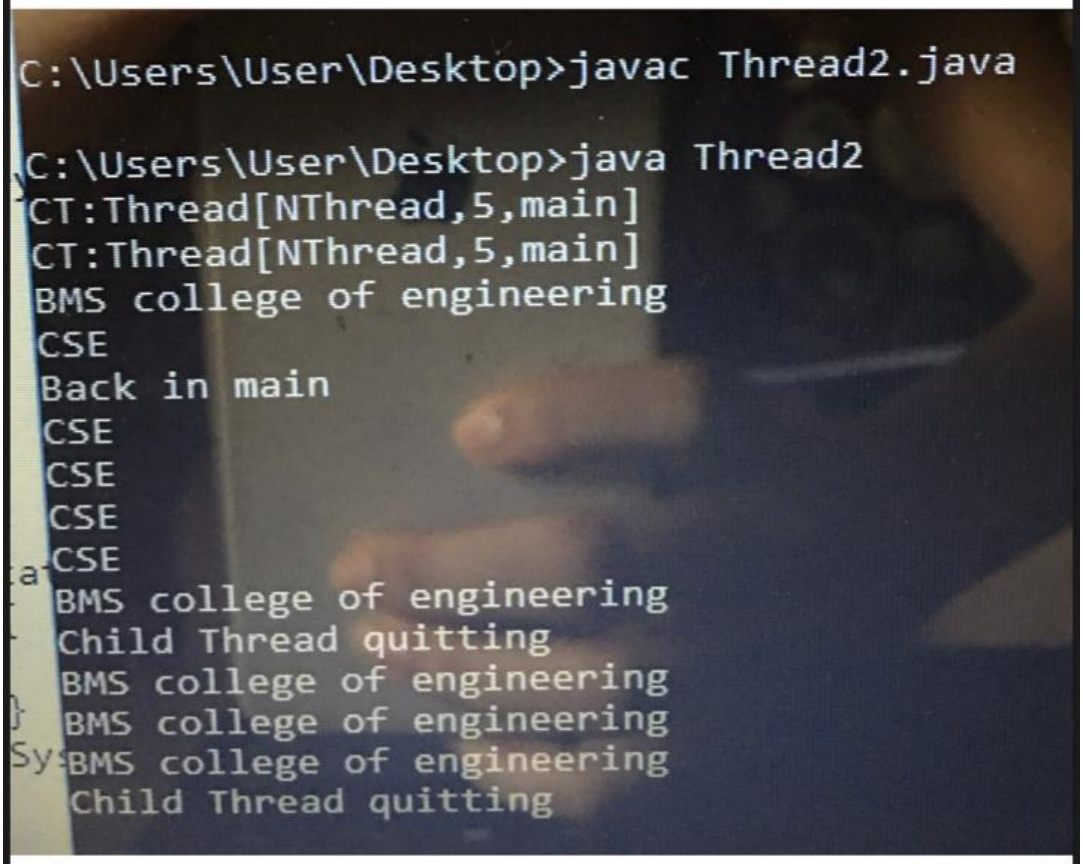
```
class Thread2
{
    public static void main(String ss[])
    {
        Thread1 n1 = new Thread1("BMS college of
```

quitting");
}
}

8/12/20

Dikshan B
1BM19CS050.

```
class Thread2
{
    public static void main(String ss[])
    {
        Thread1 t1= new Thread1("BMS college of
                engineering", 10000);
        Thread1 t2 = new Thread1("CSE", 2000);
                // t1.start();
        System.out.println("Back in main");
    }
}
```



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 NumberFormatException. If Num2 were Zero, the program would throw an Arithmetic Exception Display the exception in a message dialog box.

Week 13:

DISHA. D
1BM19CS050

```
import java.awt.*;
import java.awt.event.*;
import javax.swing.*;
public class Division extends Frame implements
                                    ActionListener
{
    TextField n1, n2, res;
    Label l1, l2, lres;
    Button b;
    public Division()
    {
     setLayout(new FlowLayout());
     Label l1 = new Label("NUM1", Label.RIGHT);
     Label l2 = new Label("NUM2", Label.RIGHT);
     Label lres = new Label("Result", Label.RIGHT);
     n1 = new TextField(12);
     n2 = new TextField(8);
     res = new TextField(10);
     b = new Button("DIVIDE");
     add(l1);
     add(n1);
     add(l2);
     add(n2);
     add(b);
     add(lres);
     add(res);
     b.addActionListener(this);
     addWindowListener(new MyWindowAdapter());
    }
  public void actionPerformed(ActionEvent ae)
{
  if(ae.getSource()==b)
  {
    try{
```

```
        int num1 = Integer.parseInt(n1.getText());
        int num2 = Integer.parseInt(n2.getText());
        int num3 = num1/num2;
        ans.setText(String.valueOf(num3));
    }
    catch (NumberFormatException ne)
    {
        JOptionPane.showMessageDialog(this,a,"ERROR",
          JOptionPane.ERROR_MESSAGE);
    }
  }
}
public static void main (String args[])
{
    Division i = new Division();
    i.setSize(new Dimension(400,400));
    i.setTitle("INTEGER DIVISION OF TWO NUMBERS");
    i.setVisible(true);
  }
class MyWindowAdapter extends WindowAdapter
{
public void windowClosing(WindowEvent we)
  { System.exit(0);
  }
}
}
```

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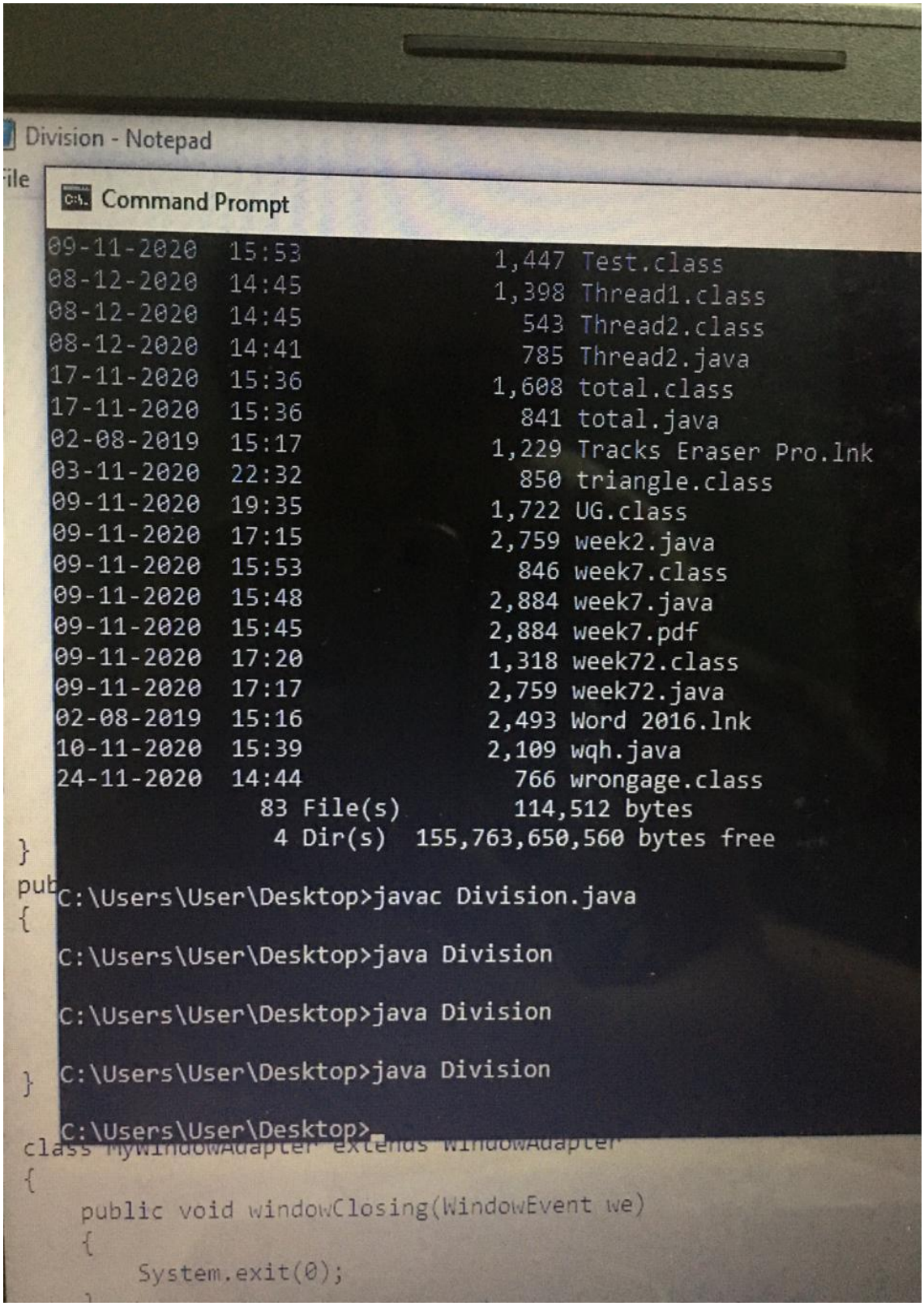
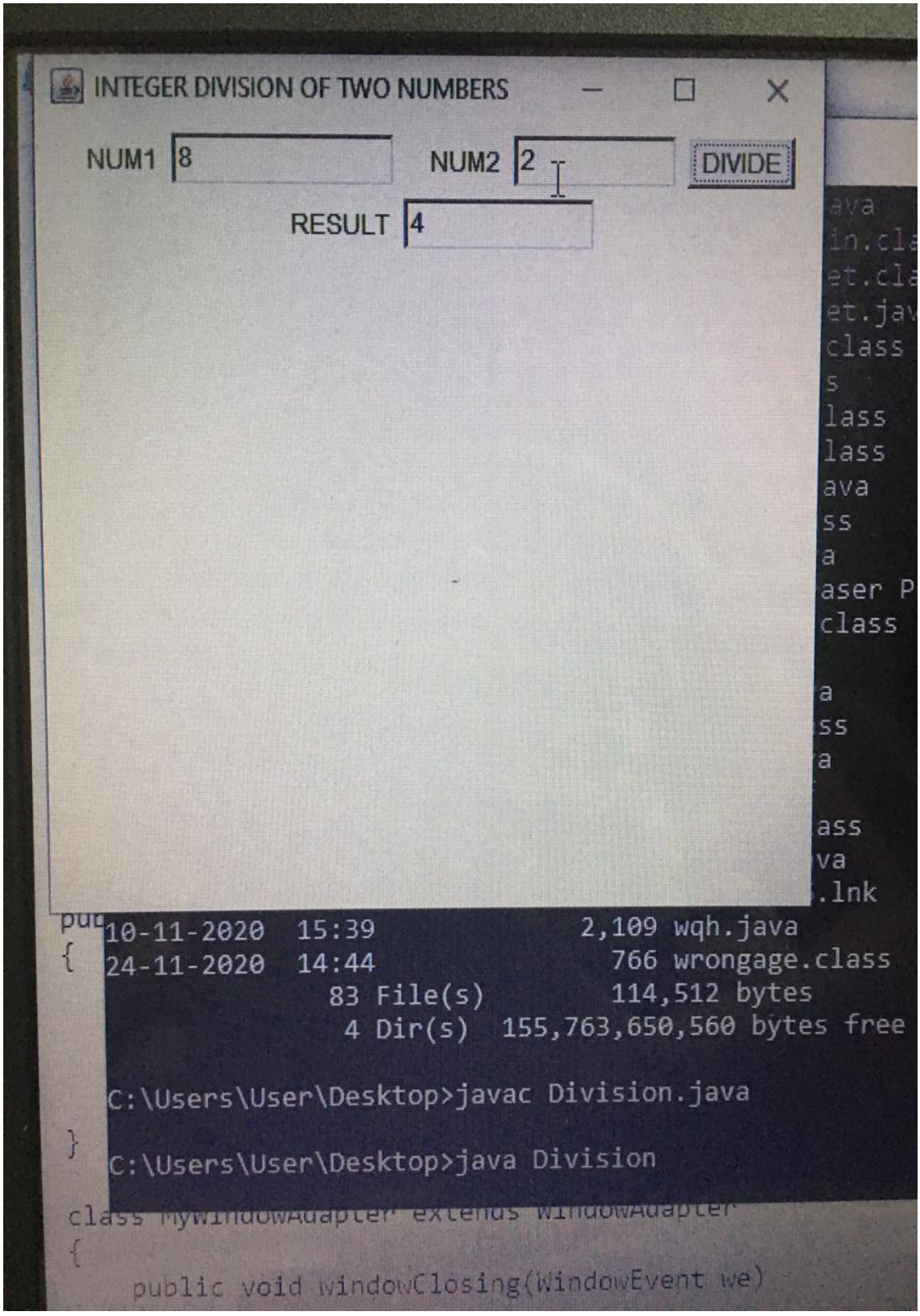
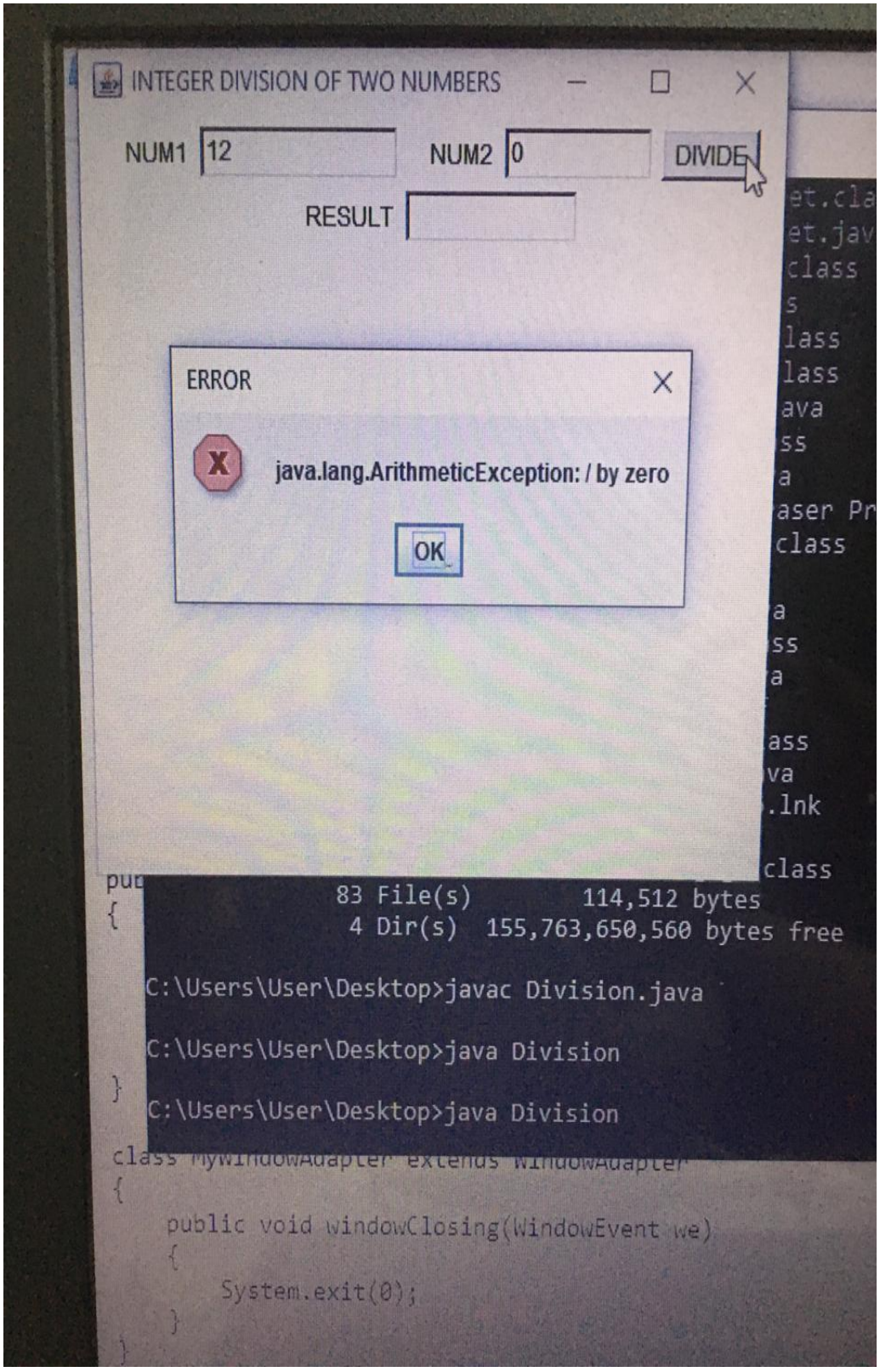
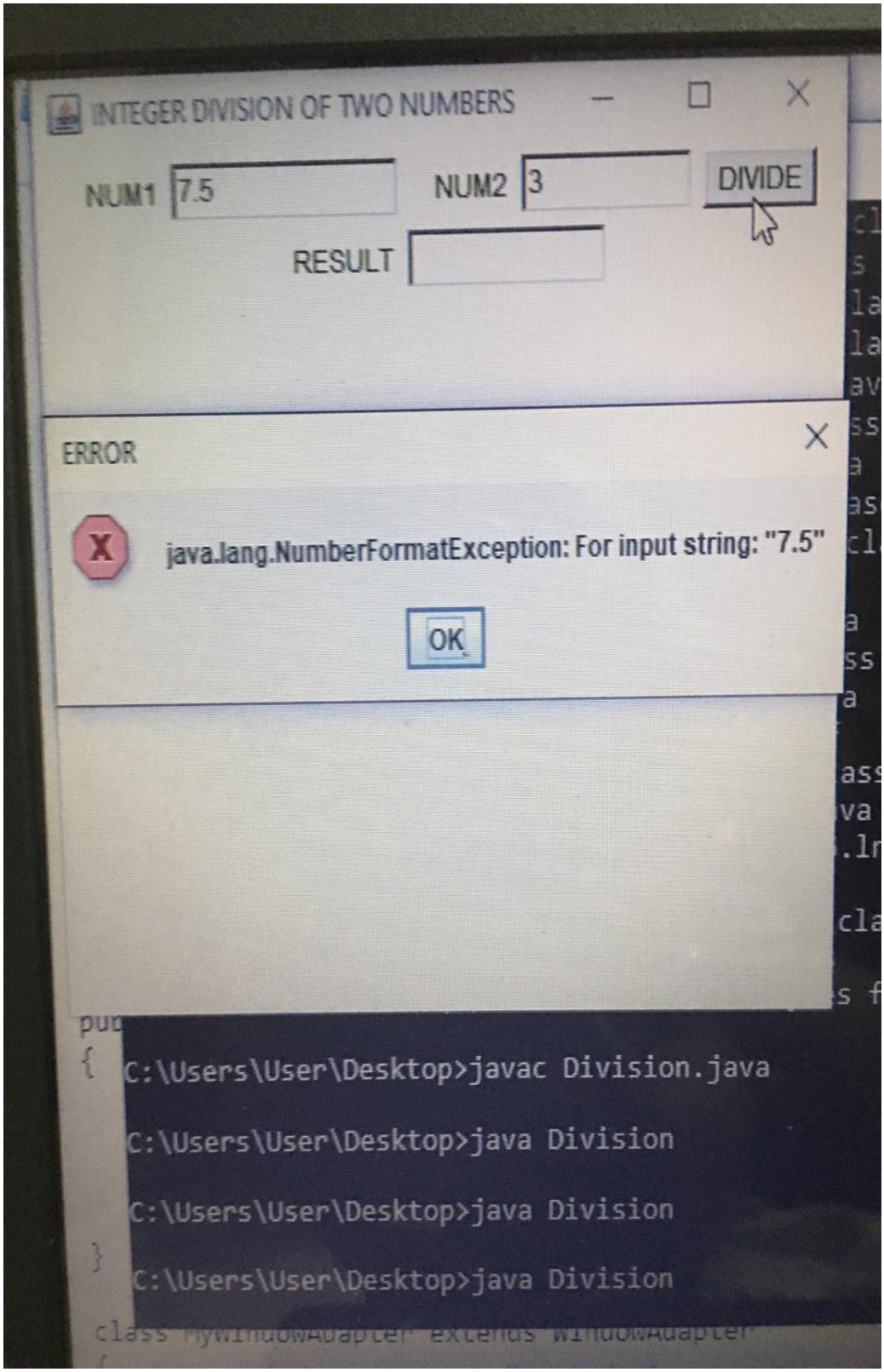
1BH19CS050


Division - Notepad
File
Command Prompt
09-11-2020 15:53 1,447 Test.class
08-12-2020 14:45 1,398 Thread1.class
08-12-2020 14:45 543 Thread2.class
08-12-2020 14:41 785 Thread2.java
17-11-2020 15:36 1,608 total.class
17-11-2020 15:36 841 total.java
02-08-2019 15:17 1,229 Tracks Eraser Pro.lnk
03-11-2020 22:32 850 triangle.class
09-11-2020 19:35 1,722 UG.class
09-11-2020 17:15 2,759 week2.java
09-11-2020 15:53 846 week7.class
09-11-2020 15:48 2,884 week7.java
09-11-2020 15:45 2,884 week7.pdf
09-11-2020 17:20 1,318 week72.class
09-11-2020 17:17 2,759 week72.java
02-08-2019 15:16 2,493 Word 2016.lnk
10-11-2020 15:39 2,109 wqh.java
24-11-2020 14:44 766 wrongage.class
83 File(s) 114,512 bytes
4 Dir(s) 155,763,650,560 bytes free
C:\Users\User\Desktop>javac Division.java
C:\Users\User\Desktop>java Division
C:\Users\User\Desktop>java Division
C:\Users\User\Desktop>java Division
C:\Users\User\Desktop>
class MyWindowAdapter extends WindowAdapter
{
public void windowClosing(WindowEvent we)
{
System.exit(0);


INTEGER DIVISION OF TWO NUMBERS
NUM1 8
NUM2 2
DIVIDE
RESULT 4
10-11-2020 15:39 2,109 wqh.java
24-11-2020 14:44 766 wrongage.class
83 File(s) 114,512 bytes
4 Dir(s) 155,763,650,560 bytes free
C:\Users\User\Desktop>javac Division.java
C:\Users\User\Desktop>java Division
class MyWindowAdapter extends WindowAdapter
{
public void windowClosing(WindowEvent we)


INTEGER DIVISION OF TWO NUMBERS
NUM1 12
NUM2 0
DIVIDE
RESULT
ERROR
java.lang.ArithmeticException: / by zero
OK
83 File(s) 114,512 bytes
4 Dir(s) 155,763,650,560 bytes free
C:\Users\User\Desktop>javac Division.java
C:\Users\User\Desktop>java Division
C:\Users\User\Desktop>java Division
public void windowClosing(WindowEvent we)
System.exit(0);


INTEGER DIVISION OF TWO NUMBERS
NUM1
7.5
NUM2
3
DIVIDE
RESULT
ERROR
java.lang.NumberFormatException: For input string: "7.5"
OK
C:\Users\User\Desktop>javac Division.java
C:\Users\User\Desktop>java Division
C:\Users\User\Desktop>java Division
C:\Users\User\Desktop>java Division