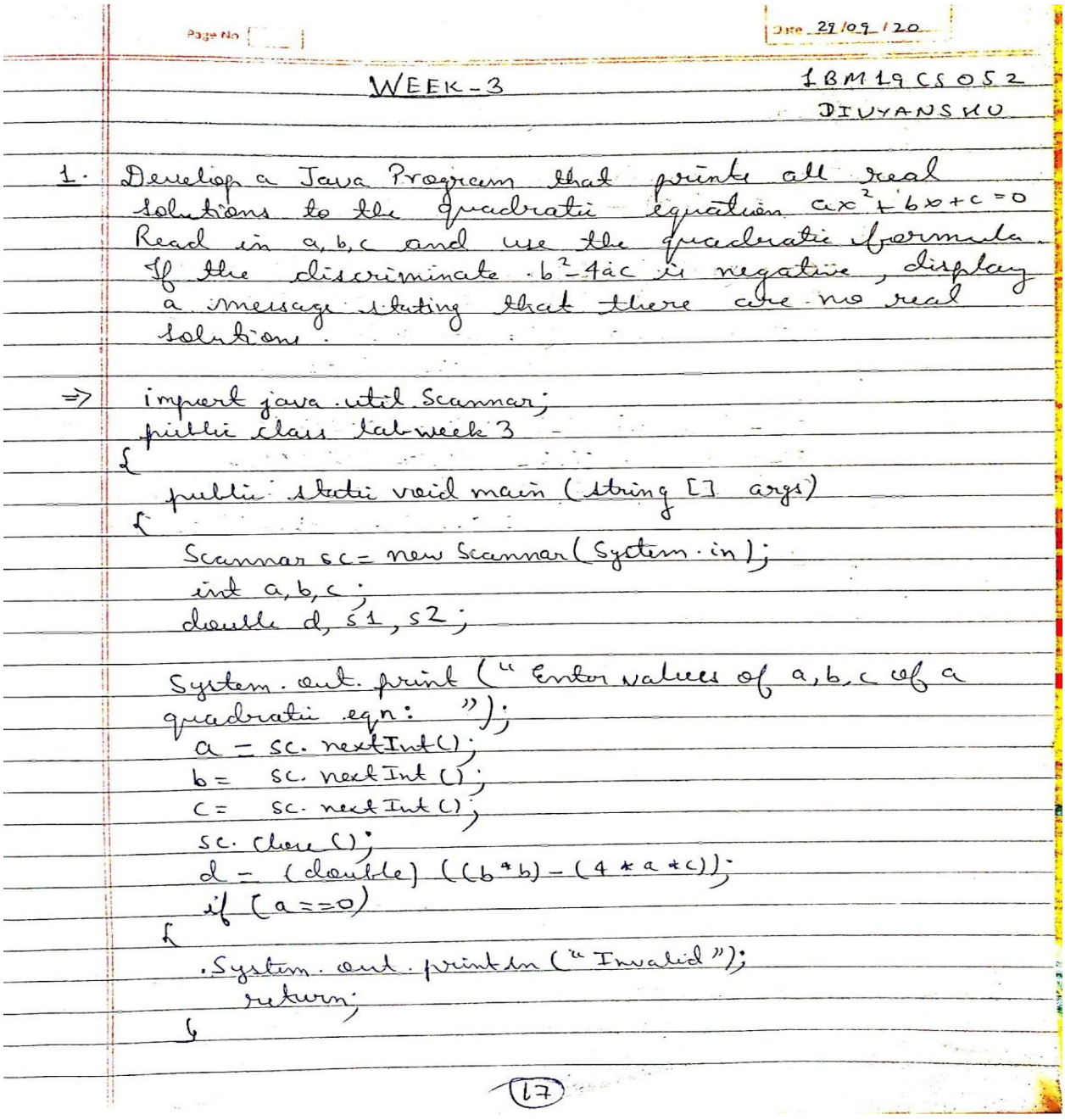
Lab Program 1

Develop a Java program that prints all real solutions to the quadratic equation ax2 +bx+c = 0. Read in a, b, c and use the quadratic formula. If the discriminate b2-4ac is negative, display a message stating that there are no real solutions.

Observation(Write-up)



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Date 29/09/20

WEEK-3

1BM19CS052
DIVYANSHU

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.

=>

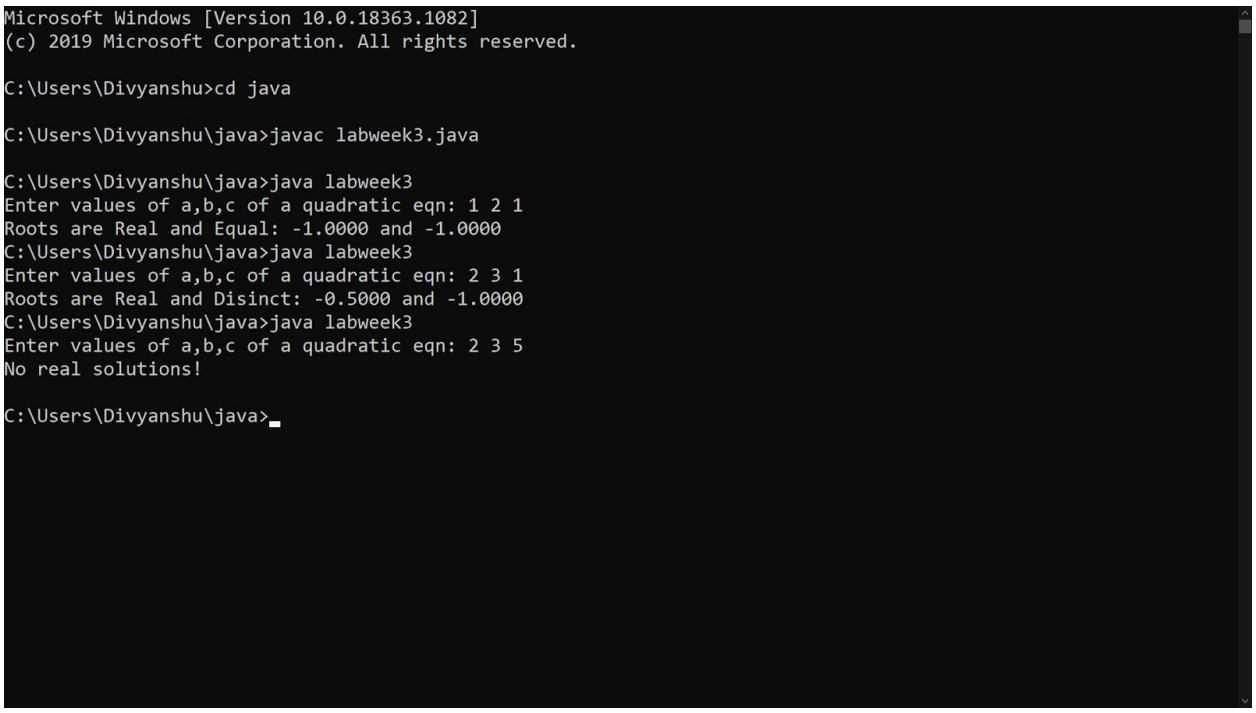
```
import java.util.Scanner;
public class lab_week3
{
  public static void main (String [] args)
  {
    Scanner sc= new Scanner(System.in);
    int a,b,c;
    double d, s1, s2;

    System.out.print("Enter values of a,b,c of a
    quadratic eqn: ");
     a = sc.nextInt();
     b= sc.nextInt();
     c= sc.nextInt();
     sc.close();
     d = (double) ((b*b)-(4*a*c));
     if (a==0)
     {
       System.out.println("Invalid");
         return;
     }
```

17

```
if (d<0)
{
System.out.println("No real solutions!");
} else if (d==0)
{
s1 = (double) ((-b + Math.sqrt(d)) / (2*a));
s2 = (double) ((-b - Math.sqrt(d)) / (2*a));
System.out.printf("Roots are Real and Equal : %.4f
                   and %.4f", s1, s2);
} else {
s1 = (double) ((-b + Math.sqrt(d)) / (2*a));
s2 = (double) ((-b - Math.sqrt(d)) / (2*a));
System.out.printf("Roots are Real and Distinct
                   : %.4f and %.4f", s1, s2);
}
}
}
```

1BM19CS052_RECORD_TEST

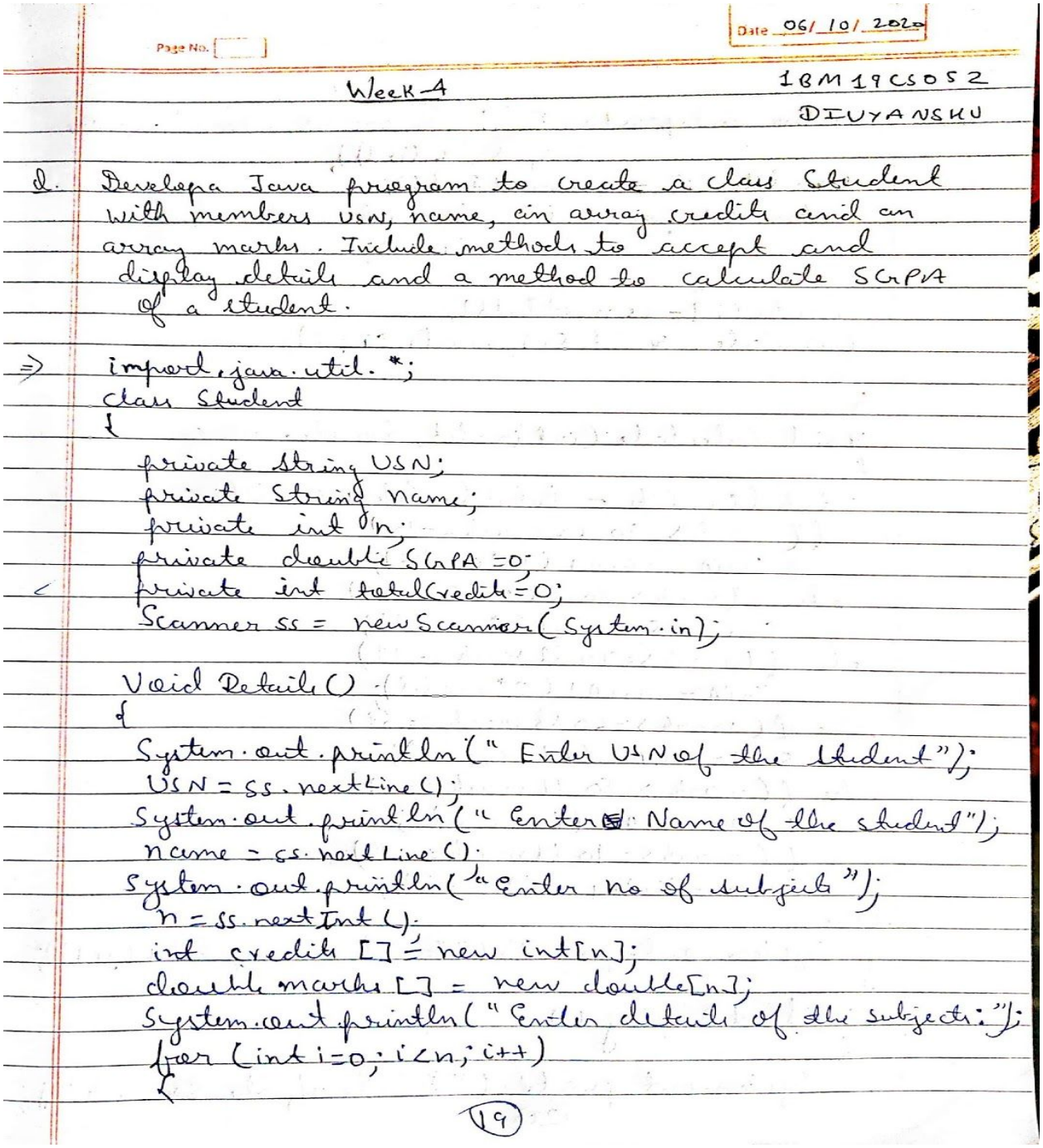
Output



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.

Observation(Write-up)



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Week-4

1BM19CS052

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1. 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.

```
import java.util.*;
class Student
{
    private String USN;
    private String name;
    private int n;
    private double SGPA=0;
    private int totalCredit=0;
    Scanner ss = new Scanner(System.in);

    Void Details()
    {
    System.out.println("Enter USN of the student");
    USN = ss.nextLine();
    System.out.println("Enter Name of the student");
    name = ss.nextLine();
    System.out.println("Enter no of subjects");
    n = ss.nextInt();
    int credit[] = new int[n];
    double marks[] = new double[n];
    System.out.println("Enter details of the subjects:");
    for(int i=0; i<n; i++)
    {
```

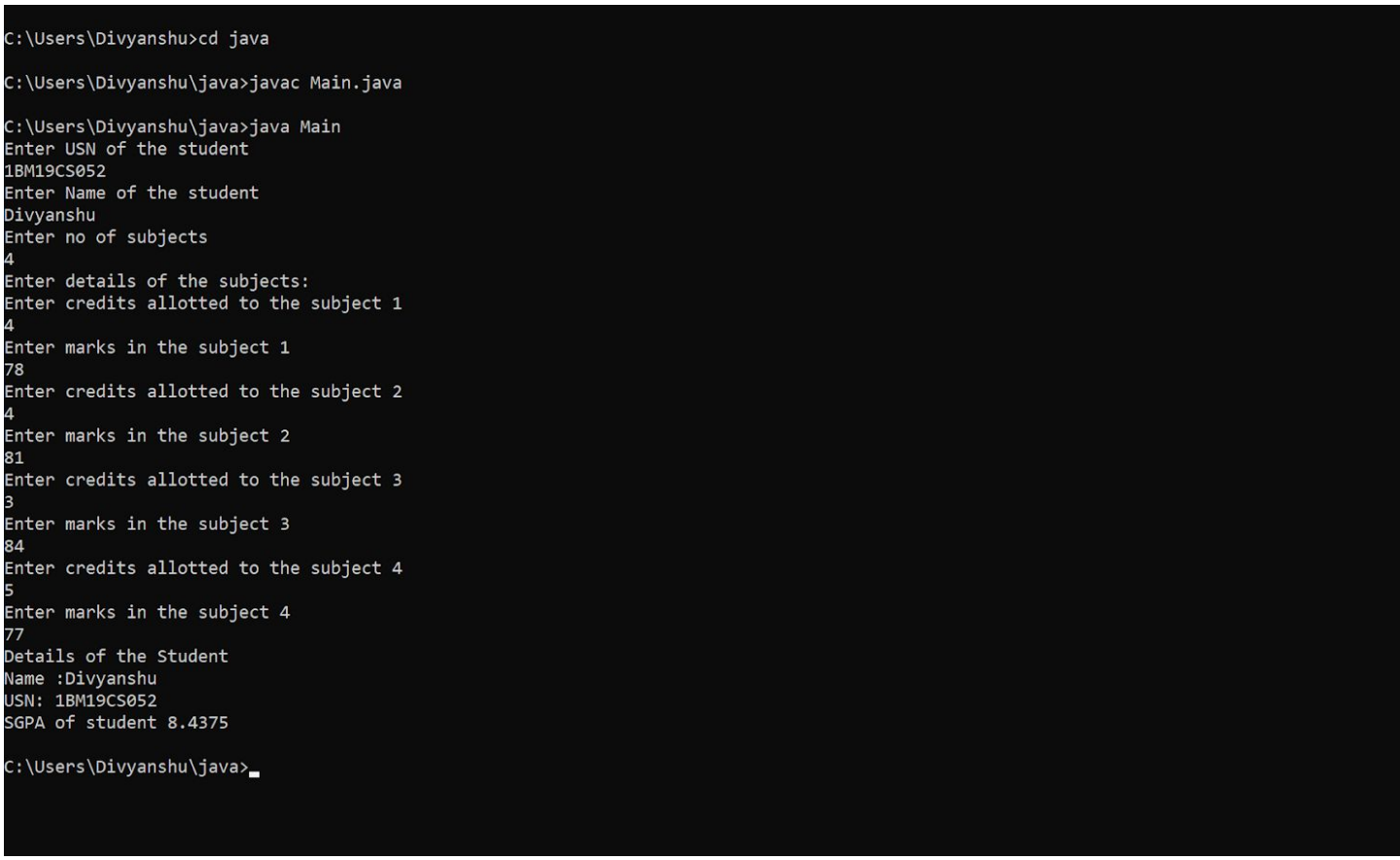
```
System.out.println("Enter credits allotted to the
                    Subject "+(i+1));
Credits[i] = ss.nextInt();
System.out.println("Enter marks in the subject "
                    +(i+1));

marks[i] = ss.nextInt();
Calculate.(Credits[i], marks[i], i);
}
}
Void Calculate(int credit, double mark, int j)
{
 totalCredits = totalCredits + credit;
 if(mark>=90 && mark<=100)
     SGPA = SGPA + (10*credit);
 else if(mark>=80 && mark<=89)
     SGPA = SGPA + (9*credit);
 else if(mark>=70 && mark<=79)
     SGPA = SGPA + (8*credit);
 else if(mark>=60 && mark<=69)
     SGPA = SGPA + (07*credit);
 else if(mark>=50 && mark<=59)
     SGPA = SGPA + (6*credit);
 else if(mark>=40 && mark<=49)
     SGPA = SGPA + (5*credit);
 else
    System.out.println("Failed in subject:"+(j+1));
}
 void Display()
 {
    System.out.println("Details of the Student");
```

```
System.out.println("Name :"+name);
System.out.println("USN: "+USN);
System.out.println("SGPA of student "+(SGPA/
                                    total(credits));
    }
}
Class Main
{
  public static void main(String args[])
  {
    Student s1 = new Student();
    s1.Details();
    s1.Display();
  }
}
```

1BM19CS052_RECORD_TEST

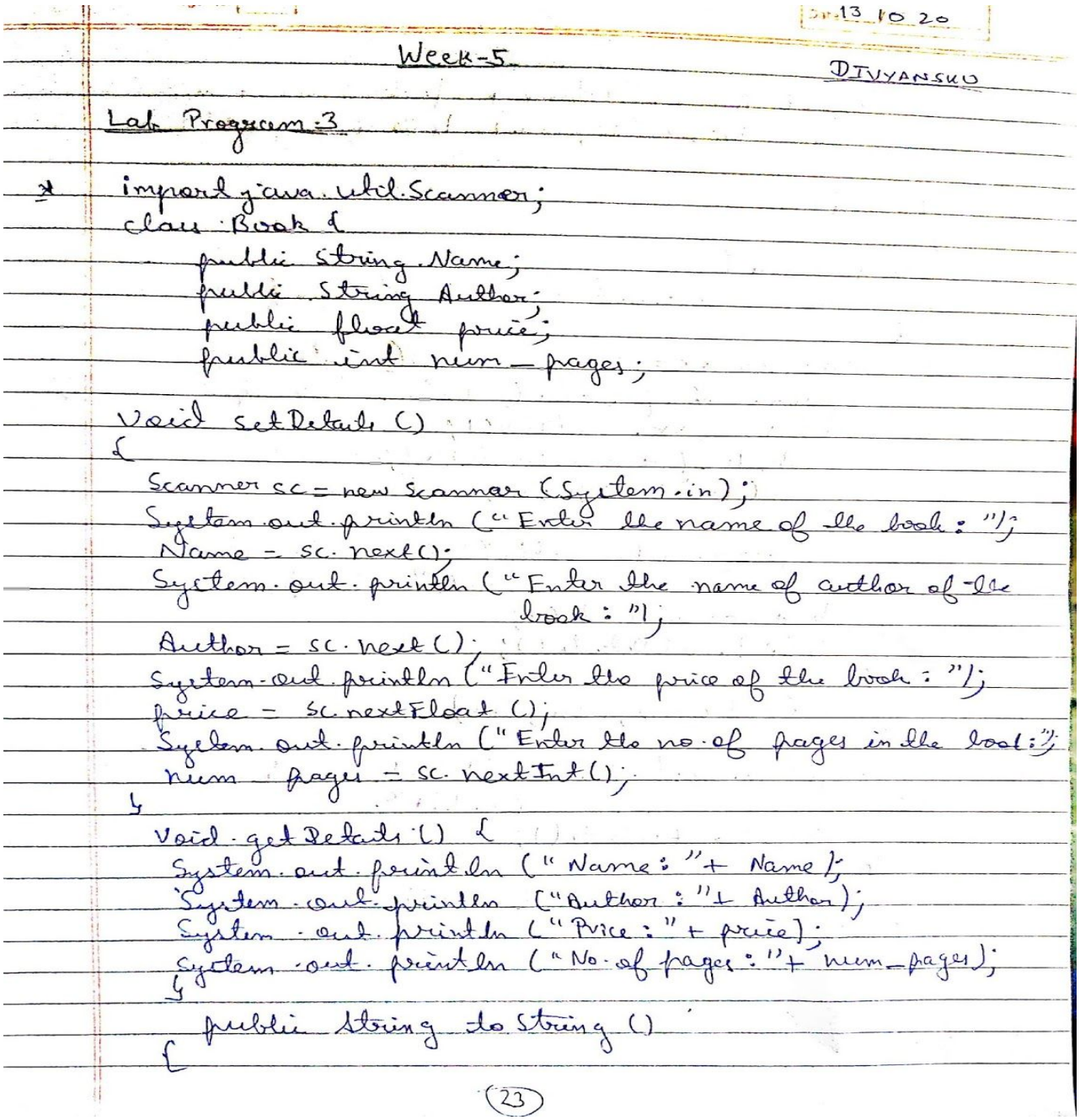
OUTPUT



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.

Observation (write-up)



13 10 20

Week-5

DIVYANSHU

Lab Program-3

```
import java.util.Scanner;
class Book {
    public String Name;
    public String Author;
    public float price;
    public int num_pages;

void setDetails ()
{
  Scanner sc = new Scanner (System.in);
  System.out.println ("Enter the name of the book : ");
  Name = sc.next();
  System.out.println ("Enter the name of author of the
                       book : ");
  Author = sc.next();
  System.out.println ("Enter the price of the book : ");
  price = sc.nextFloat ();
  System.out.println ("Enter the no.of pages in the book:");
  num_pages = sc.nextInt();
}
  void getDetails () {
   System.out.println ("Name : "+ Name);
   System.out.println ("Author : "+ Author);
   System.out.println ("Price : "+ price);
   System.out.println ("No.of pages : "+ num_pages);
  }
    public String toString ()
{
```

```
return ("Name:" + Name + "\nAuthor:" + Author + "\n
        Price:" + price + "\n No.of pages:" + num_pa
}
}
class Bmain {
  public static void main (String[] args)
  {
    Scanner xx = new Scanner(System.in);
    System.out.println("Enter the no of book");
    int n = xx.nextInt();
    Book b[] = new Book[n];
    for(int i=0;i<n;i++)
    {
      System.out.println("Enter the details of the
                          book" + (i+1) + ":");
      b[i] = new Book();
      b[i].setDetails();
    }
    for (int i=0;i<n;i++)
    {
      System.out.println("Book Details of book
                          (i+1)+":");
      b[i].getDetails();
    }
    System.out.println(b[1]);
  }
}
```

1BM19CS052_RECORD_TEST

OUTPUT

```
Microsoft Windows [Version 10.0.18363.1139]
(c) 2019 Microsoft Corporation. All rights reserved.

C:\Users\Divyanshu>cd java

C:\Users\Divyanshu\java>javac BookBmain.java

C:\Users\Divyanshu\java>java Bmain
Enter the no. of book
3
Enter the details of the book1:
Enter the name of the book:
Java
Enter the name of author of the book:
Oracle
Enter the price of the book:
560
Enter the no.of pages in the book:
990
Enter the details of the book2:
Enter the name of the book:
OS
Enter the name of author of the book:
Galvin
Enter the price of the book:
760
Enter the no.of pages in the book:
998
Enter the details of the book3:
Enter the name of the book:
COA
Enter the name of author of the book:
Morris
Enter the price of the book:
760
Enter the no.of pages in the book:
889
Book Details of book1:
Name:Java
Author:Oracle
Price:560.0
No. of pages:990
Book Details of book2:
Name:OS
Author:Galvin
Price:760.0
No. of pages:998
Book Details of book3:
Name:COA
Author:Morris
Price:760.0
No. of pages:889
Aame:OS
Author:Galvin
```

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(write-up)

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Week-8

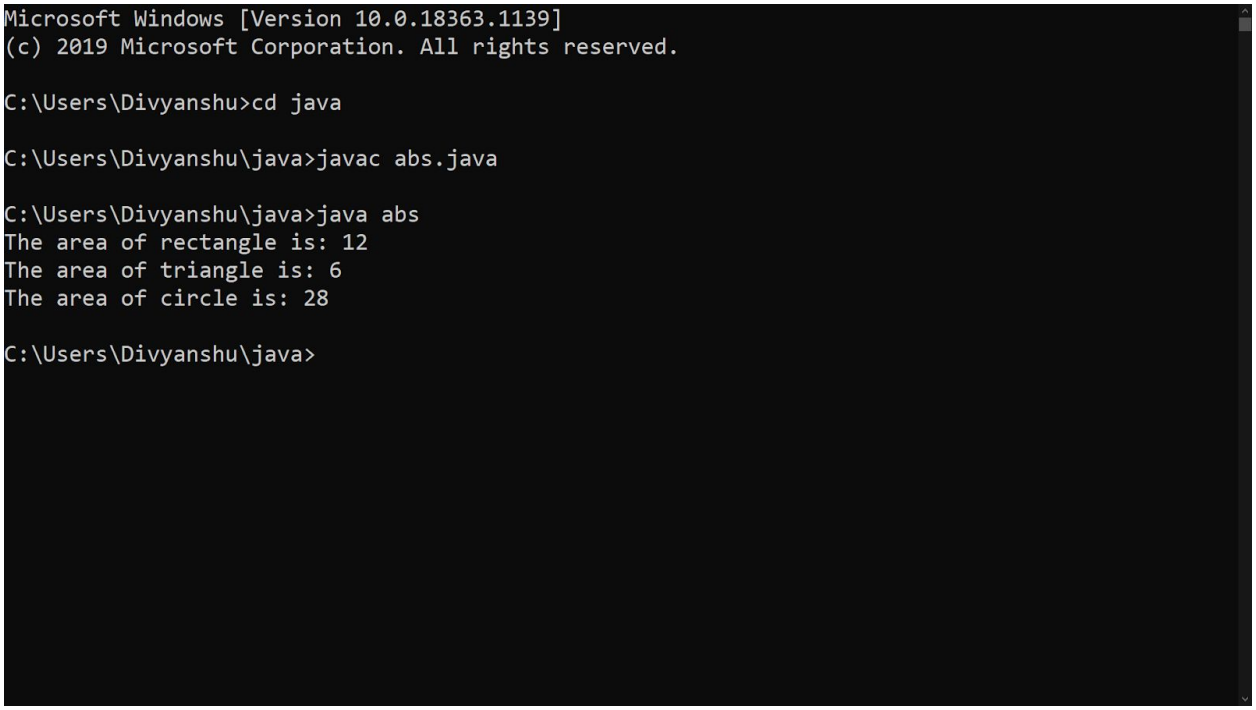
Lab Program-4

```
abstract class Shape.
{
  int a=3, b=4;
  abstract public void print_area();
}
class rectangle extends Shape.
{
  public int area_rect;
    @Override
  public void print_area()
  {
    area_rect = a*b;
    System.out.println("The area of rectangle is:"+area
                                    _rect);
  }
}
class triangle extends Shape
{
  int area_tri;
  @Override
  public void print_area()
  {
    area_tri = (int)(0.5*a*b);
    System.out.println("The area of triangle is:"+area_
                                    tri);
  }
}
class circle extends Shape.
{
```

```
int area_circle;
@Override
public void print_area()
{
area_circle = (int)(3.14 * a * a);
System.out.println("The area of circle is : "+area_
                    circle);
  }
}
class ab {
  public static void main(String[] args) {
    rectangle ree = new rectangle();
    ree.print_area();
    triangle.tri = new triangle();
    tri.print_area();
    circle.cir = new circle();
    cir.print.area();
  }
}
```

1BM19CS052_RECORD_TEST

OUTPUT



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

Observation(write-ups)

Lab Program-5

```
import java.util.Scanner;
class account
{
  private String name;
  private long account_number;
  private int account_type;
  double balance;
  void get_data()
  {
    Scanner ss = new Scanner(System.in);
    System.out.println("Enter your Name");
     name = ss.next();
     System.out.println("Enter the Account Number");
     account_number = ss.nextLong();
     System.out.println("Choose the account
                         type: \n 1. Savings account
                         \n 2. current account");
    account_type = ss.nextInt();
  }
  int return_account_type()
  {
    return account_type;
  }
}
class savings extends account
{
  Scanner ss = new Scanner(System.in);
  double amount;
```

```
void get_sav_balance()
{
  System.out.println("Enter the Amount to
    be placed in your savings account");
  amount = ss.nextDouble();
  balance += amount;
}
void display_sav_balance()
{
  System.out.println("balance =" + balance);
}
void compute_sav_interest()
{
  System.out.println("\n ** Calculating Compound
                      Interest **");
  System.out.print("Enter annual interest rate
                    : ");
  float rate = ss.nextFloat();
  System.out.print("Enter time in years: ");
  float time = ss.nextFloat();
  System.out.print("Enter principle: ");
  float principle = ss.nextFloat();
  float CI = (float)(principle * (Math.pow
      ((1+rate/(12*100)),(12*time))))
      - principle);
  System.out.println("The Compound Interest is
                      : " +(CI));
}
void withdrawal_sav()
{
  System.out.println("Enter the amount to
                      be withdrawn");
```

```
amount = ss.nextDouble();
balance = balance - amount;
}
}
class current extends account.
{
  Scanner ss = new Scanner(System.in);
  double amount;
  final double min_balance = 500;
  void get_cur_balance()
  {
    System.out.println("Enter the amount
      to be placed in your current account");
    amount = ss.nextDouble();
    balance += amount;
  }
  void display_cur_blnce()
  {
    System.out.println("Balance = "+balance);
  }
  void compute_cur_service_charges()
  {
    if (balance < min_balance)
    {
      System.out.println("service tax of
        Rs. 100 shall be levied");
      balance = balance - 100;
    }
    else
    {
      System.out.println("Minimum balance
        is Maintained");
    }
```

```
}
Void withdrawl_cur()
{
  System.out.println("Enter the amount to be withdrawn");
  amount = ss.nextDouble();
  balance = balance - amount;
}
}
class bank_main
{
  public static void main(String args[])
  {
    Scanner ss = new Scanner(System.in);
    int type;
    System.out.println("Enter the bank details");
    account acc = new account();
    acc.get_data();
    type = acc.return_account_type();
    if(type == 1)
    {
      System.out.println("SAVINGS ACCOUNT");
      saving sav = new saving();
      sav.Get_sav_balance();
      sav.display_sav_blnce();
      System.out.println("Do you want to Calculate Interest or not: In If yes press 1 else 0");
      int ch = ss.nextInt();
      if(ch == 1)
      {
```

```
        Sav.compute_sav_interest();
    }
    Sav.display_sav_blnce();
    Sav.withdrawl_sav();
    sav.display_sav_blnce();
}
if (type==2)
{
    System.out.println("CURRENT ACCOUNT");
    Current cur = new Current();
    cur.get_cur_balance();
    cur.display_cur_blnce();
    cur.compute_cur_service_charges();
    cur.display_cur_blnce();
    cur.withdrawl_cur();
    cur.display_curblnce();
}
}
}
```

1BM19CS052_RECORD_TEST

OUTPUT

```
C:\Users\Divyanshu\java>javac bank_main.java

C:\Users\Divyanshu\java>java bank_main
Enter the bank details
Enter your Name
Divyanshu
Enter the Account Number
1800019
Choose the account type:
1.savings account
2.current account
1
SAVINGS ACCOUNT
Enter the Amount to be placed in your Savings Account
67000
balance= 67000.0
Do you want to calculate Interest or not:
If yes press 1 else 0
1

**Calculating Compound Interest**
Enter annual interest rate: 6
Enter time in years: 3
Enter principle: 4500
The Compound Interest is: 885.06146
balance= 67000.0
Enter the amount to be withdrawn
1500
balance= 65500.0

C:\Users\Divyanshu\java>
```

1BM19CS052_RECORD_TEST

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.

Observation

Week-9

Lab Program-6

STUDENT.JAVA

```
package CIE;
import java.util.Scanner;
public class Student
{
    public String name;
    public String usn;
    public int sem;
    public void display()
    {
        Scanner s = new Scanner(System.in)
        System.out.println("Name:");
        name = s.next();
        System.out.println("Semester:");
        sem = s.nextInt();
    }
}
```

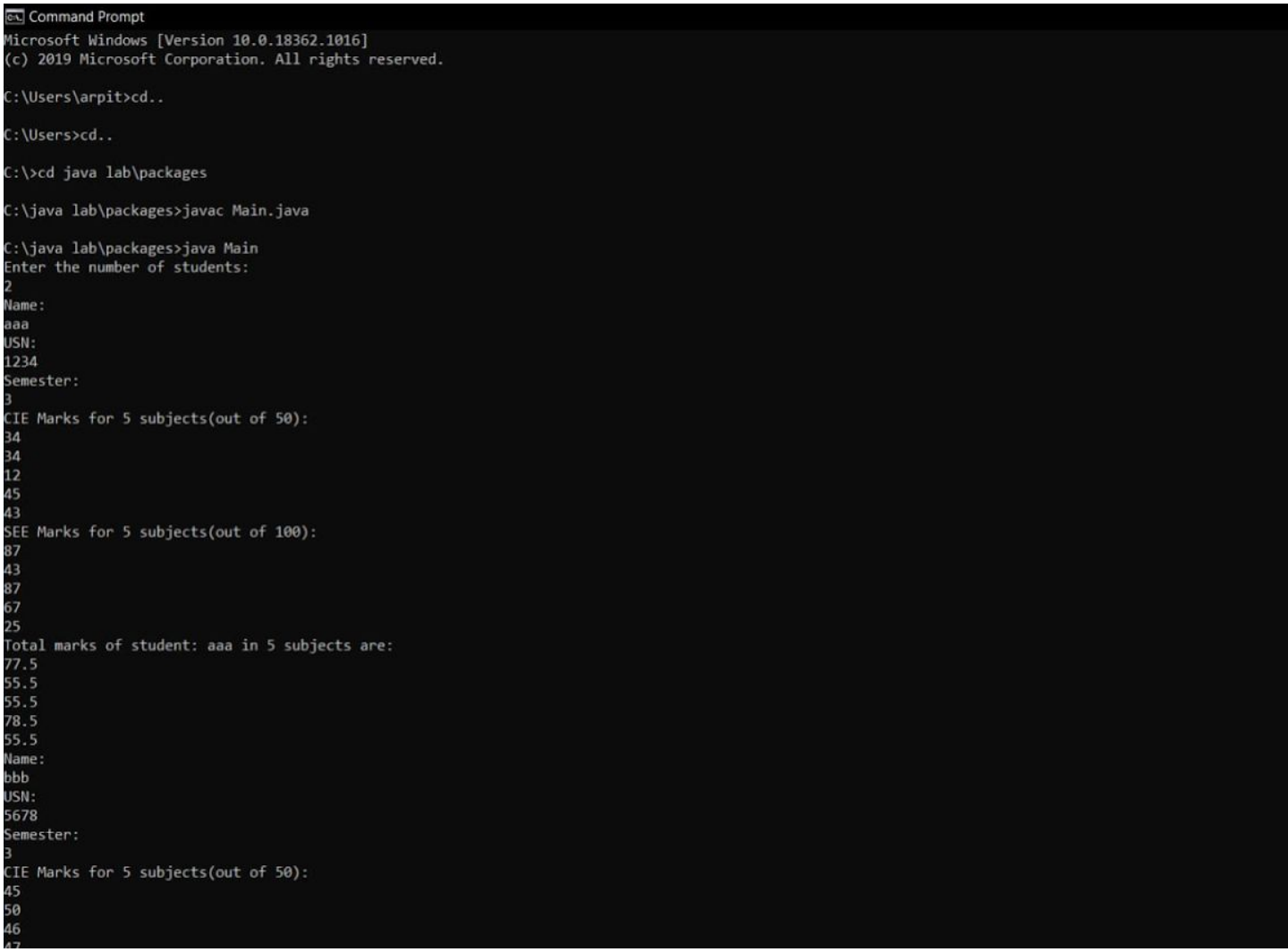
INTERNALS.JAVA

```
package SEE;
import java.util.*;
import CIE.*;
public class External extends CIE.Student
{
    public double sem[];
    public void display()
    {
```

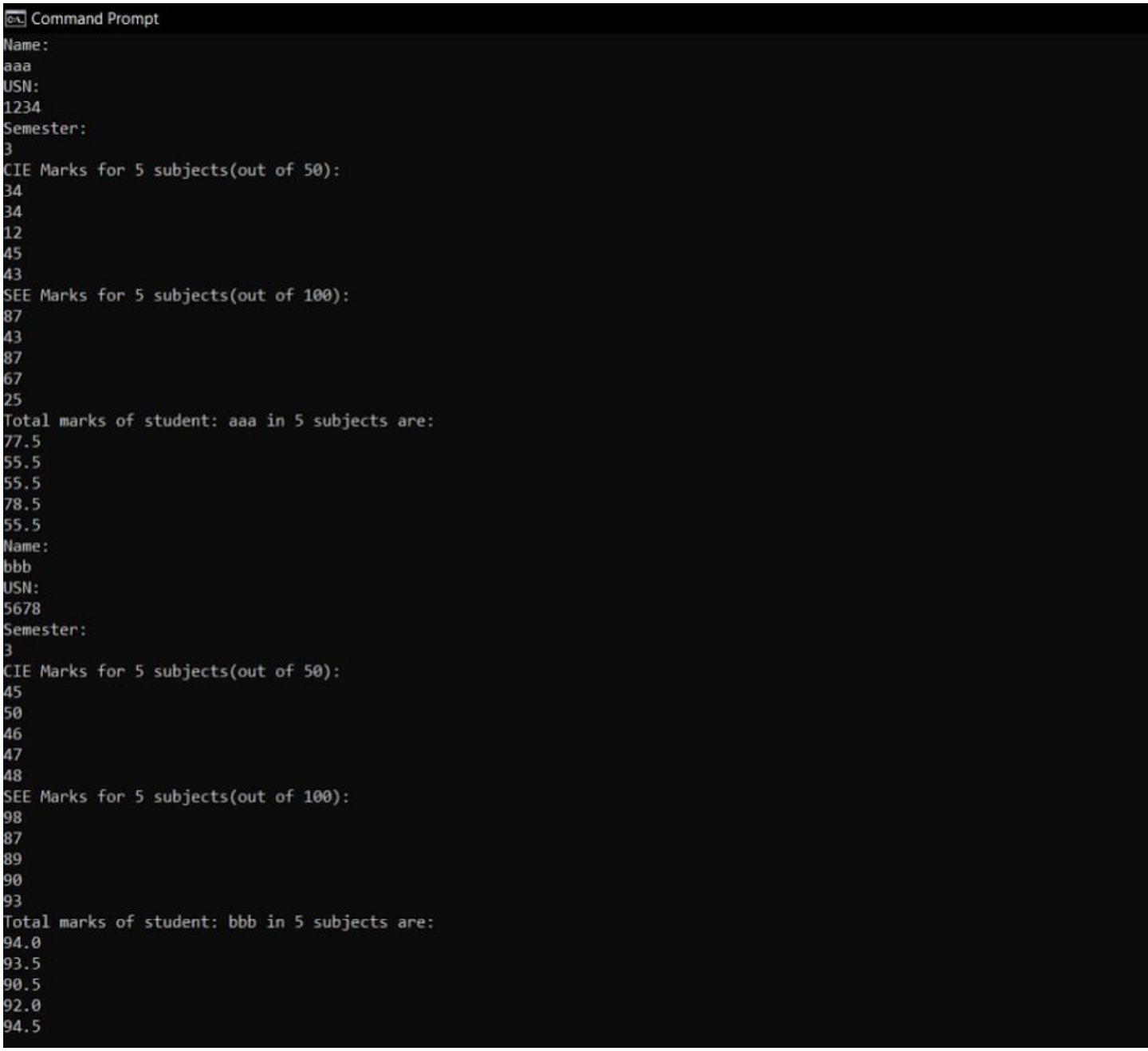
```
Seem = new double [5];
Scanner s = new Scanner (System.in);
System.out.println ("Enter the number of
n = s.nextInt();          Student : ");
CIE.Student st[] = new CIE.Student [n];
CIE.Internals in[] = new SEE.Externals [n];
for (int i=0; i<n; i++)
{
  st[i] = new CIE.Student ();
  in[i] = new CIE.Internals ();
  e[i] = new SEE.Externals ();
  st[i] = new CIE.Student ();.display ();
  in[i].display ();
  e[i].display ();
  System.out.println ("Total marks of Studnt
                       : " + st[i].name + " in
                       5 subjects are : ");
  for (int j=0; j<5; j++)
{
  System.out.println (int[i].Seem[j] + (e[i]
                       + Seem[j]) / 2));
  }
  }
}
```

1BM19CS052_RECORD_TEST

OUTPUT



1BM19CS052_RECORD_TEST



Lab Program 7

Write a program to demonstrate generics with multiple object parameters

Observation

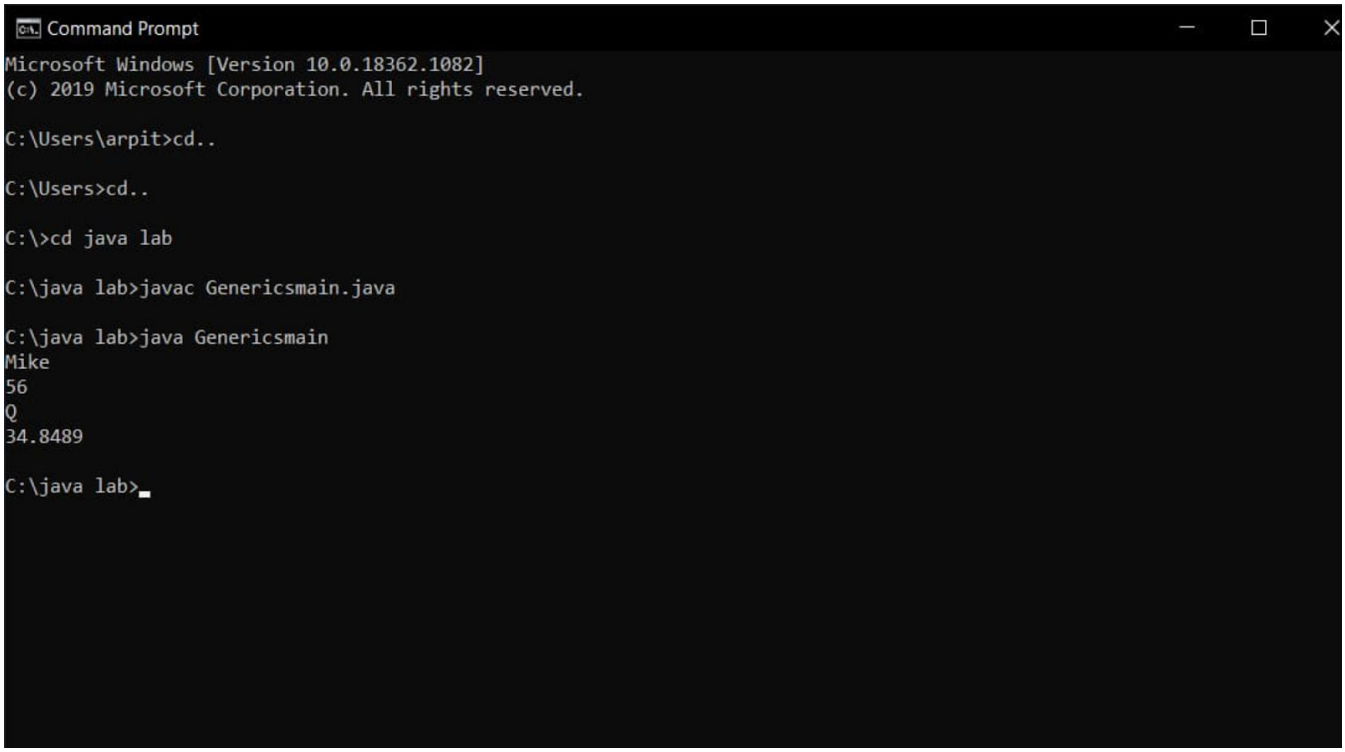
Week - 10

Lab Program - 7

```
class myGen<a, b>
    a obj1;
    b obj2;

myGen(a obj1, b obj2) {
    this.obj1 = obj1;
    this.obj2 = obj2;
}
void Display() {
    System.out.println(obj1);
    System.out.println(obj2);
    }
}

public class GenericsMain {
    public static void main(String args[]) {
        myGen<String, Integer> myG1 = new myGen
            <String, Integer>("Mike", 56);
        myGen<Character, Double> myG2 = new myGen
            <Character, Double>('Q', 34.8489);
        myG1.Display();
        myG2.Display();
    }
}
```

1BM19CS052_RECORD_TEST

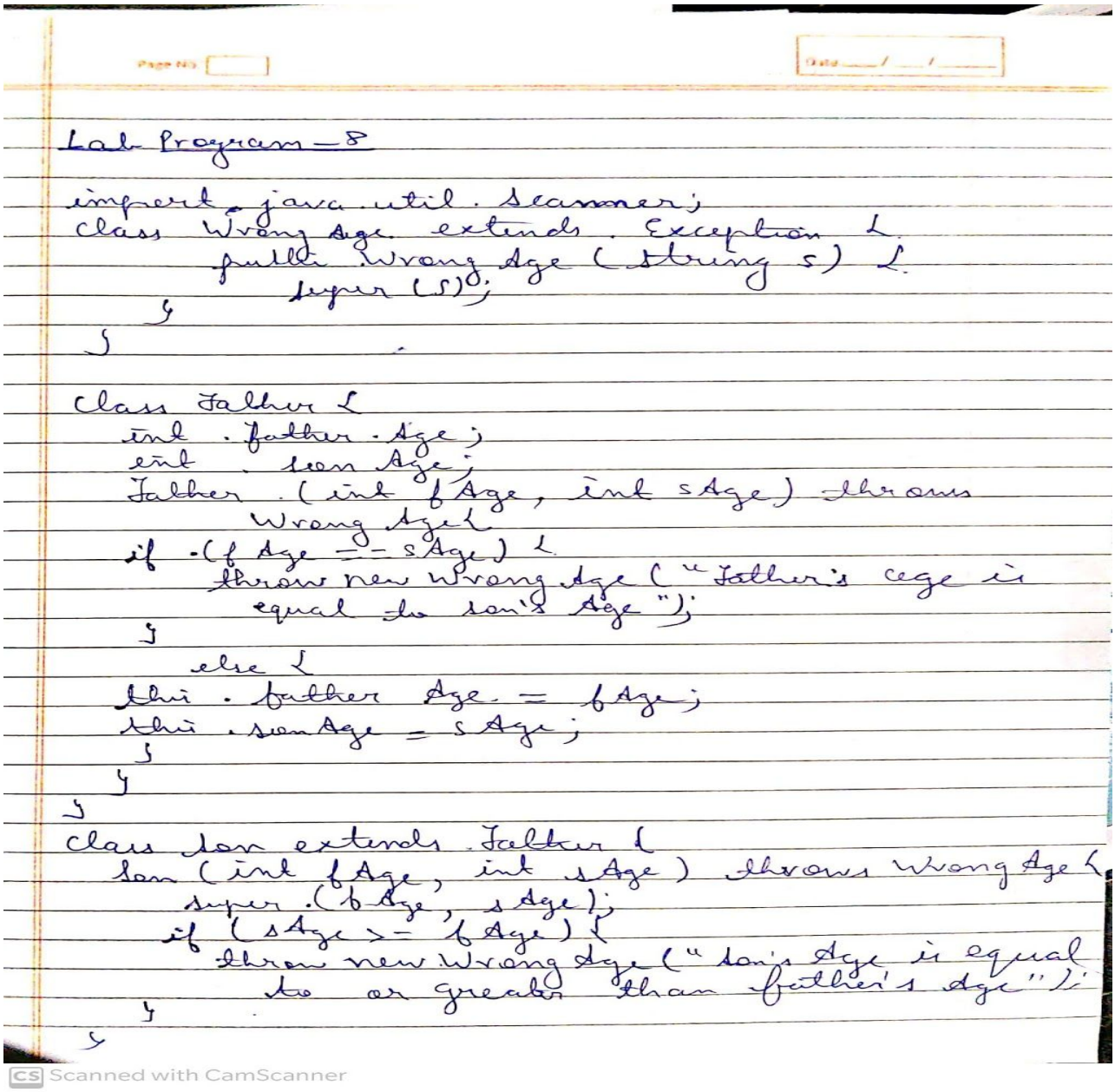
OUTPUT



Lab Program 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<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.

Observation

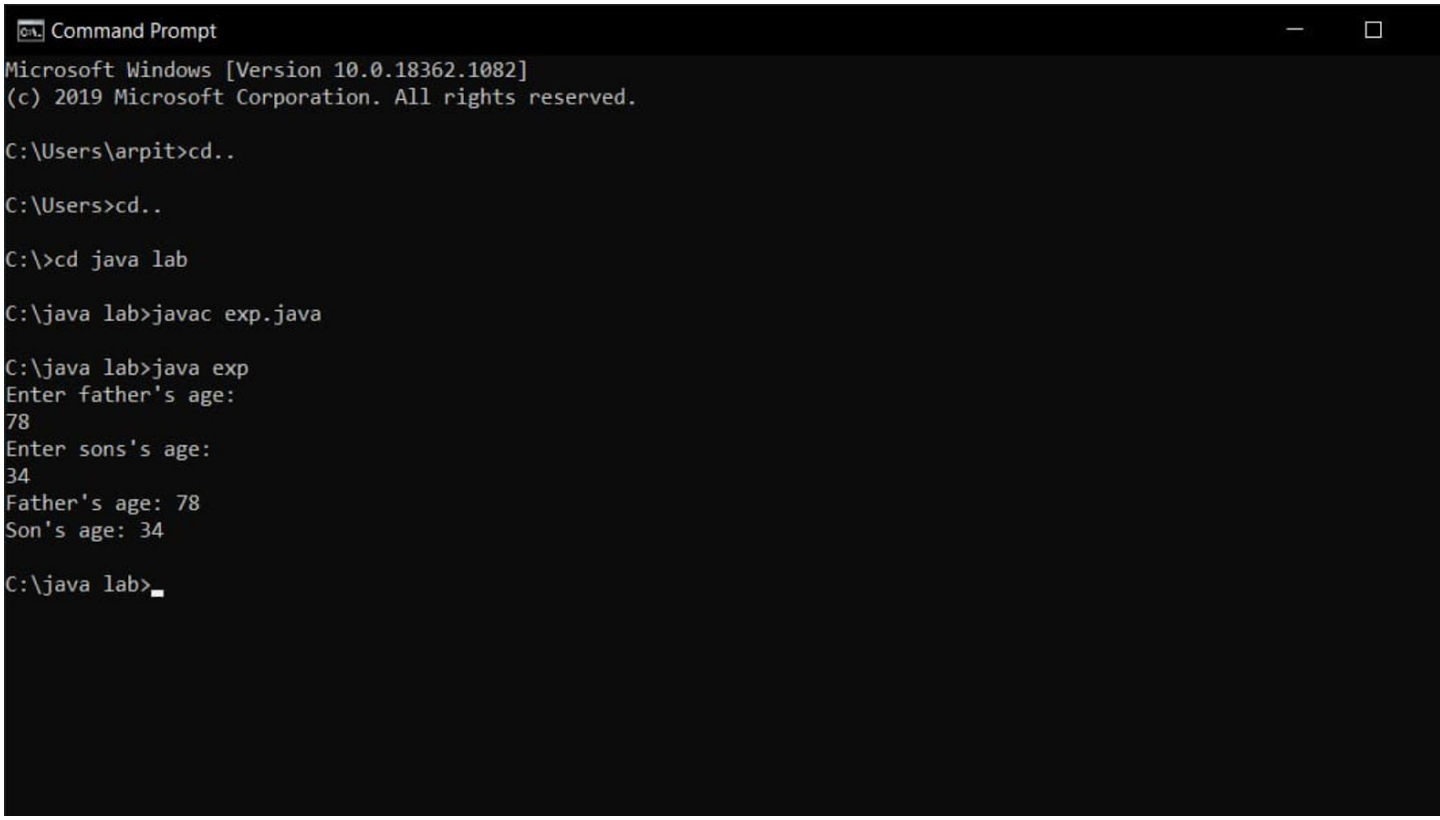


```
Lab Program – 8

import java.util.Scanner;
class WrongAge extends Exception {
    public WrongAge (String s) {
        super(s);
    }
}

class Father {
    int fatherAge;
    int sonAge;
    Father (int fAge, int sAge) throws
        WrongAge {
    if (fAge <= sAge) {
        throw new WrongAge ("Father's age is
            equal to son's age");
    }
        else {
    this.fatherAge = fAge;
    this.sonAge = sAge;
    }
    }
}
class Son extends Father {
    Son (int fAge, int sAge) throws WrongAge {
        super (fAge, sAge);
        if (sAge >= fAge) {
            throw new WrongAge ("Son's age is equal
                to or greater than father's age");
    }
}
```

```
void Display (){
    System.out.println ("Father's age: " +
                        father Age);
    System.out.println ("Son's Age: " + Son
                                        Age);
  }
}

public class exp {
  public static void main (String [] args){
    int fAge, sAge;
    Scanner sc = new Scanner (System.in);
    System.out.println ("Enter father's age
                        : ");
    fAge = sc.nextInt ();
    System.out.println ("Enter. Son's age : ");
    sAge = sc.nextInt ();
    try {
      Son son = new Son (fAge, sAge);
      son.Display ();
    } catch (WrongAge err) {
      System.out.println ("Exception " + err);
    }
  }
}
```

1BM19CS052_RECORD_TEST

OUTPUT



Lab Program 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

Page No. Date

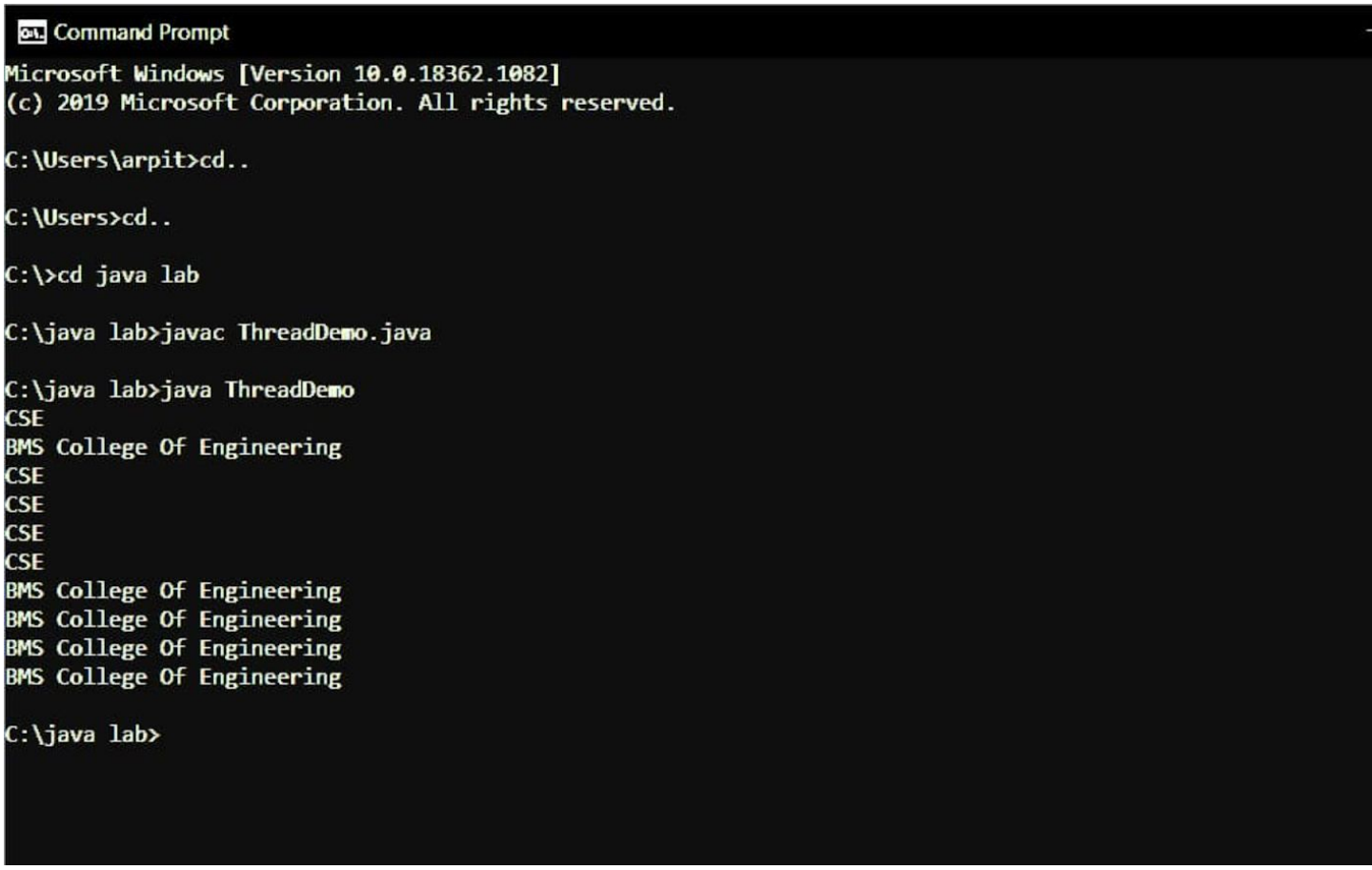
Week 11

Lab Program - 9

```
class Thread1 implements Runnable {
  String name;
  Thread t;
  int time;
  Thread1 (String threadname, int time) {
      name = threadname;
      this.time = time;
      t = new Thread (this, name);
      t.start();
  }

public void run() {
  try {
      for (int i=5; i>0; i--) {
          System.out.println(name);
          Thread.sleep(time);
      }
  } catch (InterruptedException e) {
          System.out.println(name + "Interrupted
  }
}
class ThreadDemo {
  public static void main (String args[]) {
      Thread t1 = new Thread1 ("CSE", 2000);
      Thread t2 = new Thread1 ("BMS College
                                of Engineering", 10000);
  }
}
```

1BM19CS052_RECORD_TEST

OUTPUT



Lab Program 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

Observation

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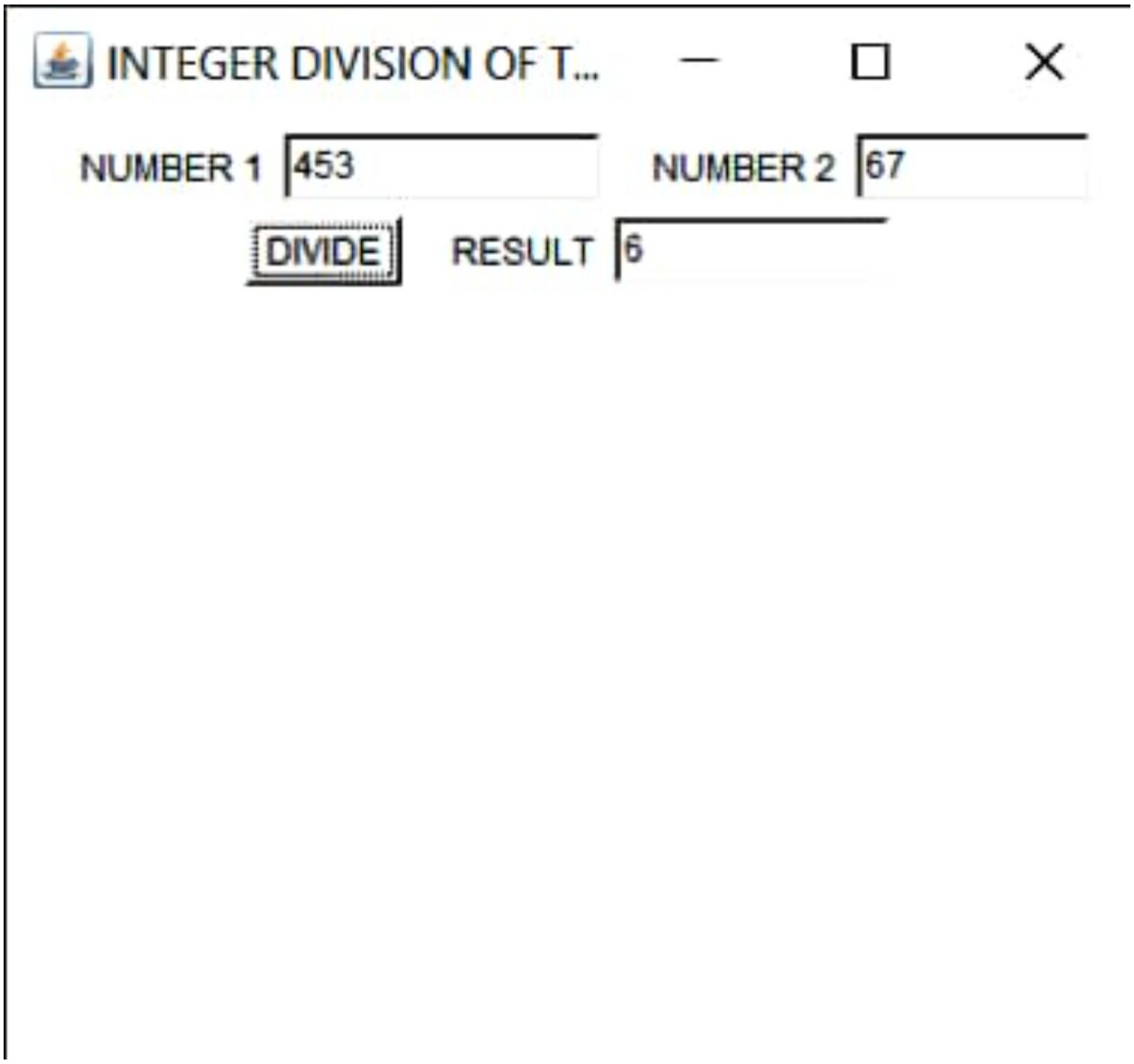
Week-13

Lab Program-10

```
import .java.awt.*;
import java.awt.event.*;
import javax.swing.*;
public class integerdivision extends Frame
  implements ActionListener {
  TextField n1, n2, res;
  Label ln1, ln2, lres;
  Button b;
  public integerdivision (){
  setLayout (new FlowLayout());
  Label ln1 = new Label ("Number 1", Label.RIGHT);
  Label ln2 = new Label ("NUMBER 2", 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 (ln1);
  add (n1);
  add (ln2);
  add (n2);
  add (lres);
  add (res);
  b.addActionListener (this);
  addWindowListener (new WindowAdapter());
  }
  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;
res.setText(String.valueOf(num3));
} catch (NumberFormatException ne) {
JOptionPane.showMessageDialog(this,ne,
"Error", JOptionPane.ERROR_MESSAGE);
}
  catch(ArithmeticException a) {
JOptionPane.showMessageDialog(this,a,"ERROR",
JOptionPane.ERROR_MESSAGE);
  }
}
}
public static void main(String args[])
{
  integerdivision i = new integerDivision();
i.setSize(new Dimension(400,400));
i.setTitle("Integer.DIVISION OF TWO NUMBERS");
i.setVisible(true);
}
class WindowAdapter1 extends WindowAdapter{
  public void windowClosing(WindowEvent we)
{
  System.exit(0);
  }
}
```


OUTPUT


INTEGER DIVISION OF T...
NUMBER 1
453
NUMBER 2
67
DIVIDE
RESULT
6