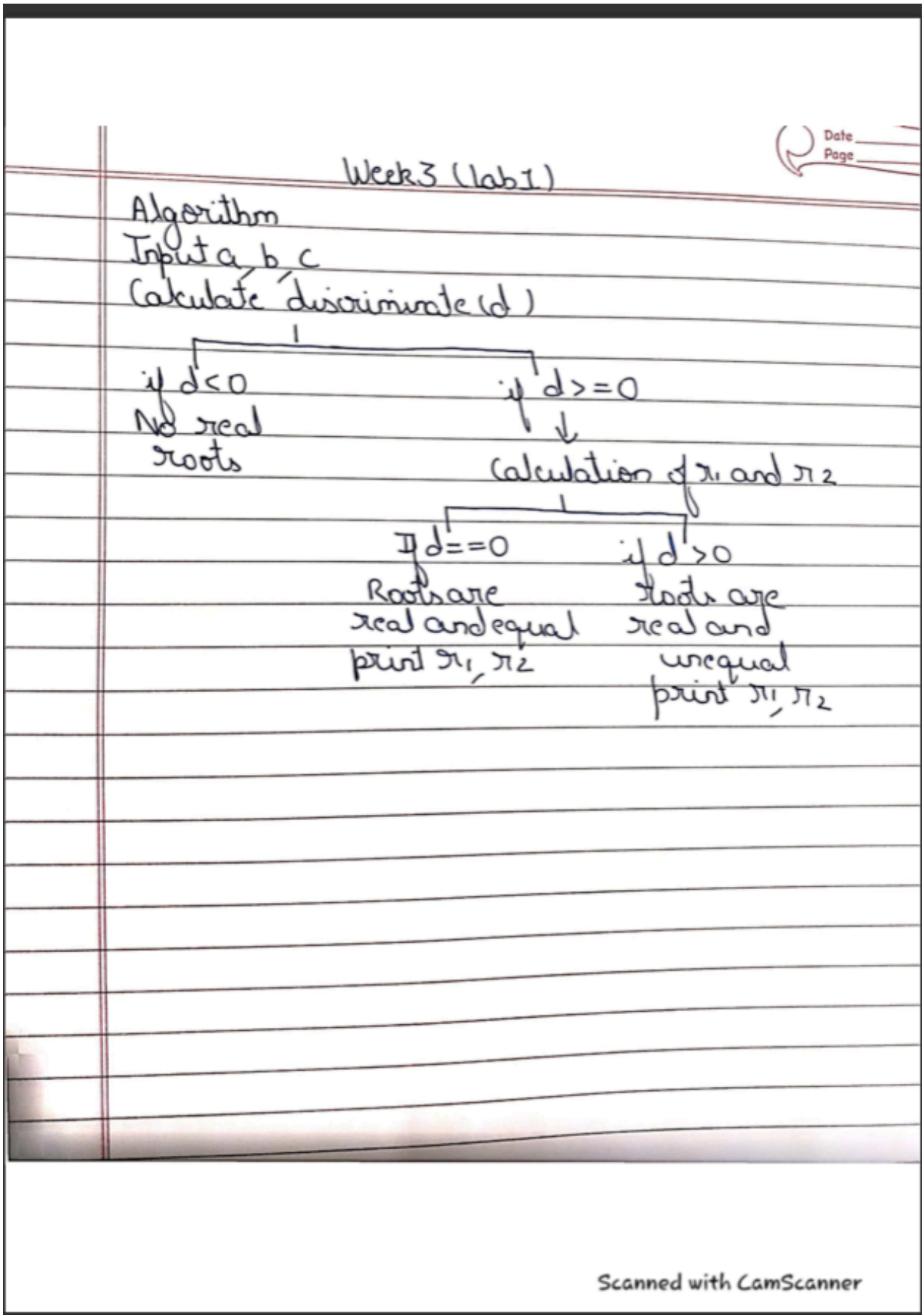
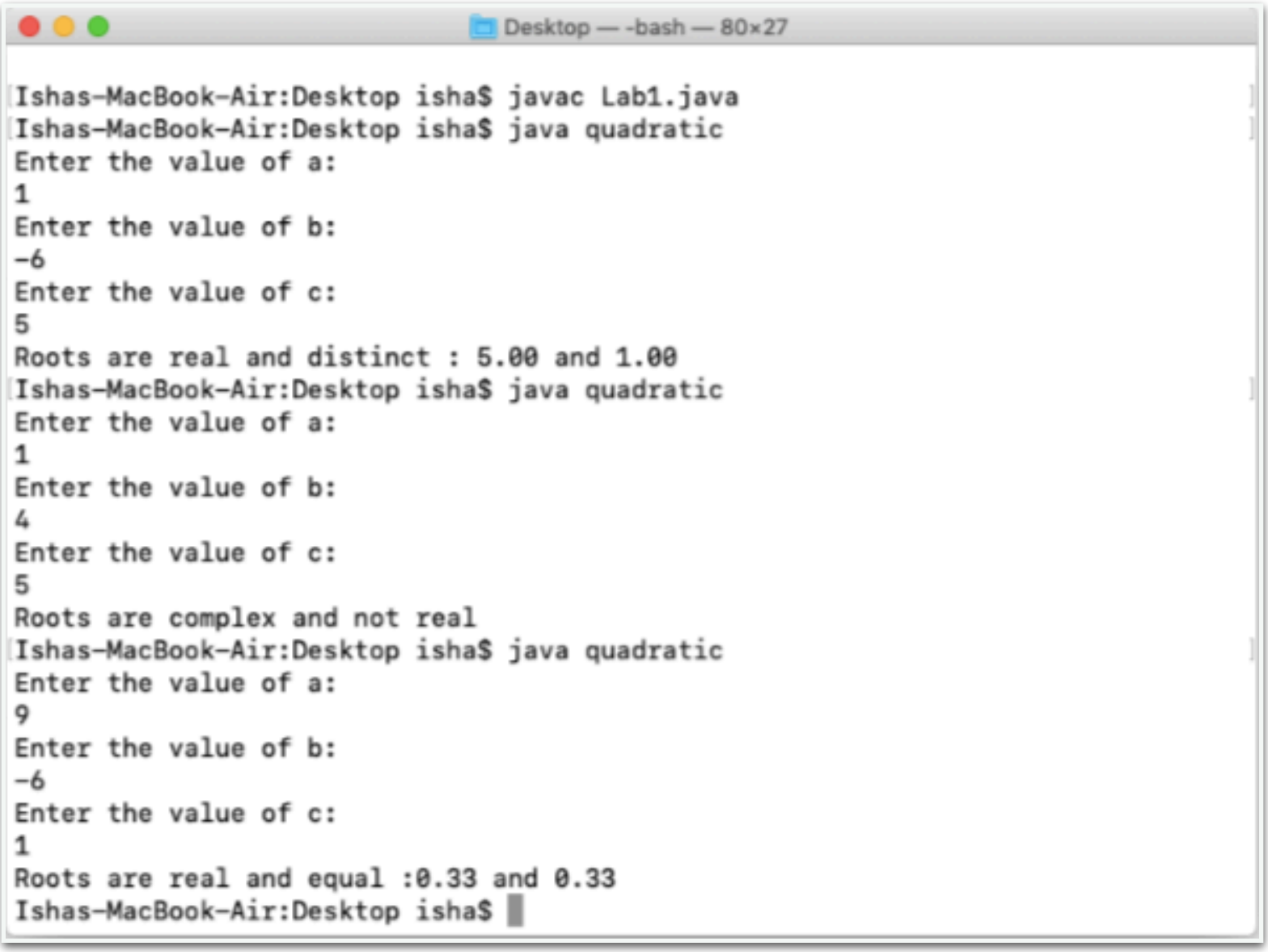
Lab Program 1

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.



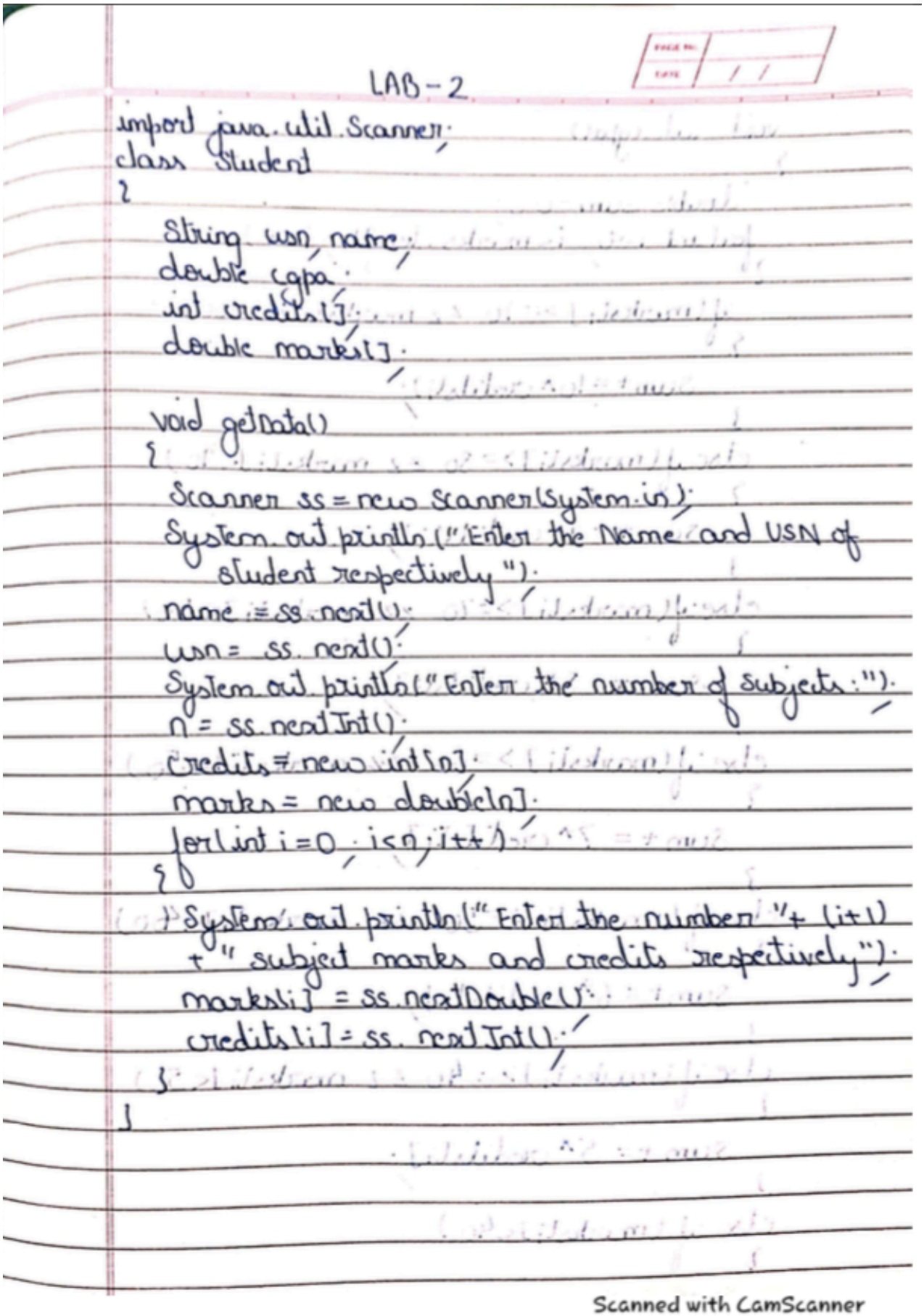
```
import java.util.Scanner;
class quadratic
{
  public static void main(String [] args)
  {
    Scanner ss = new Scanner(System.in);
    System.out.println("Enter the value of a:");
    double a = ss.nextDouble();
    System.out.println("Enter the value of b:");
    double b = ss.nextDouble();
    System.out.println("Enter the value of c:");
    double c = ss.nextDouble();

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

```
else
{
    System.out.println("Roots are complex and not real");
    System.out.println();
}
    }
}
```


Desktop — -bash — 80×27
Ishas-MacBook-Air:Desktop isha$ javac Lab1.java
Ishas-MacBook-Air:Desktop isha$ java quadratic
Enter the value of a:
1
Enter the value of b:
-6
Enter the value of c:
5
Roots are real and distinct : 5.00 and 1.00
Ishas-MacBook-Air:Desktop isha$ java quadratic
Enter the value of a:
1
Enter the value of b:
4
Enter the value of c:
5
Roots are complex and not real
Ishas-MacBook-Air:Desktop isha$ java quadratic
Enter the value of a:
9
Enter the value of b:
-6
Enter the value of c:
1
Roots are real and equal :0.33 and 0.33
Ishas-MacBook-Air:Desktop isha$

Lab Program 2:

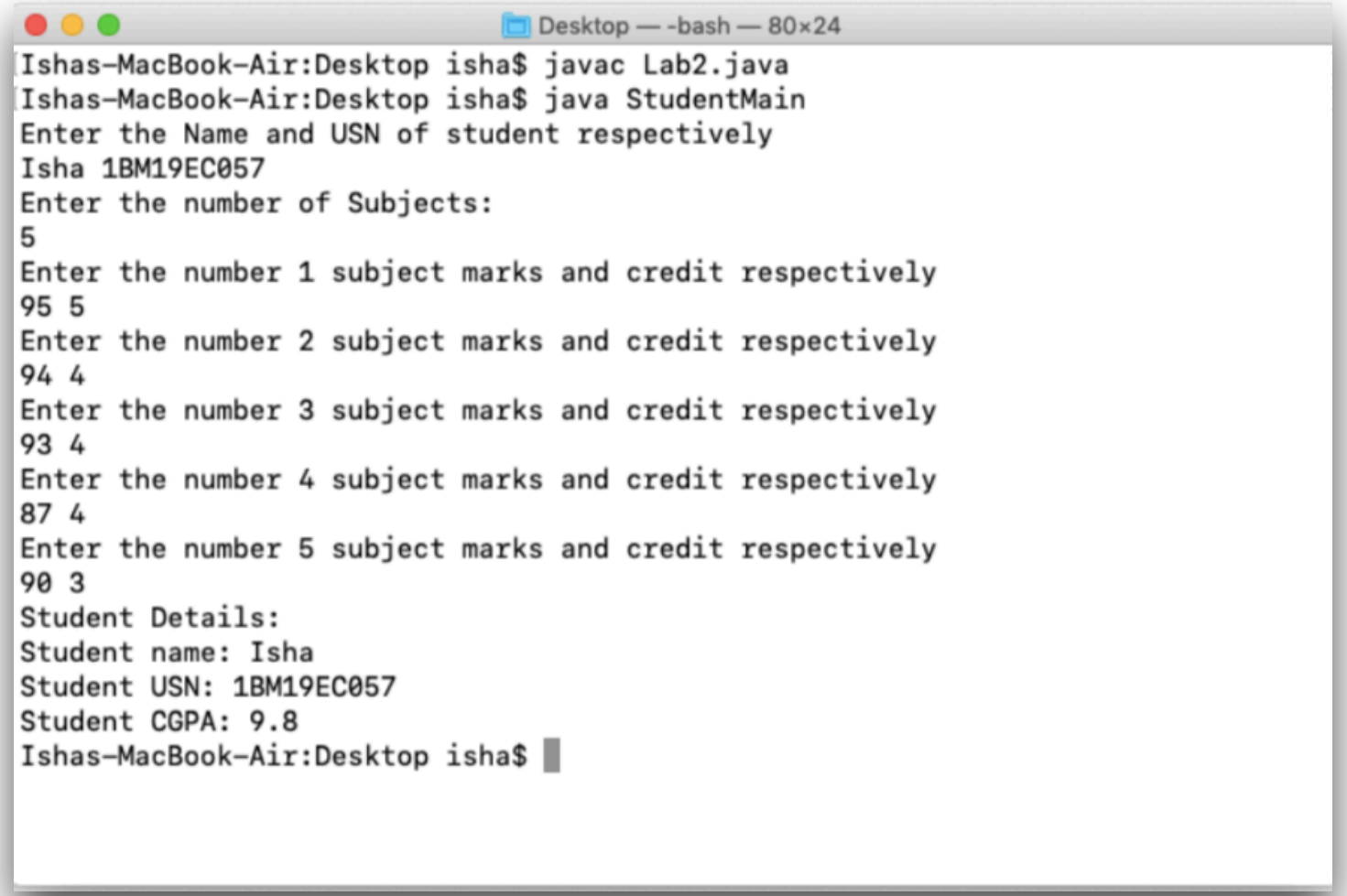
Develop a Java program to create a class Student with members usn, name, an array credits and an array marks. Include methods to accept and display details and a method to calculate SGPA of a student.



```
LAB-2

import java.util.Scanner;
class Student
{
    String usn, name;
    double cgpa;
    int credits[];
    double marks[];

    void getData()
    {
     Scanner ss = new Scanner(System.in);
     System.out.println("Enter the Name and USN of
        student respectively");
     name = ss.next();
     usn = ss.next();
     System.out.println("Enter the number of subjects:");
     n = ss.nextInt();
     credits = new int[n];
     marks = new double[n];
     for(int i=0; i<n; i++)
     {
      System.out.println("Enter the number "+(i+1)
      +" subject marks and credits respectively");
      marks[i] = ss.nextDouble();
      credits[i] = ss.nextInt();
     }
}
```

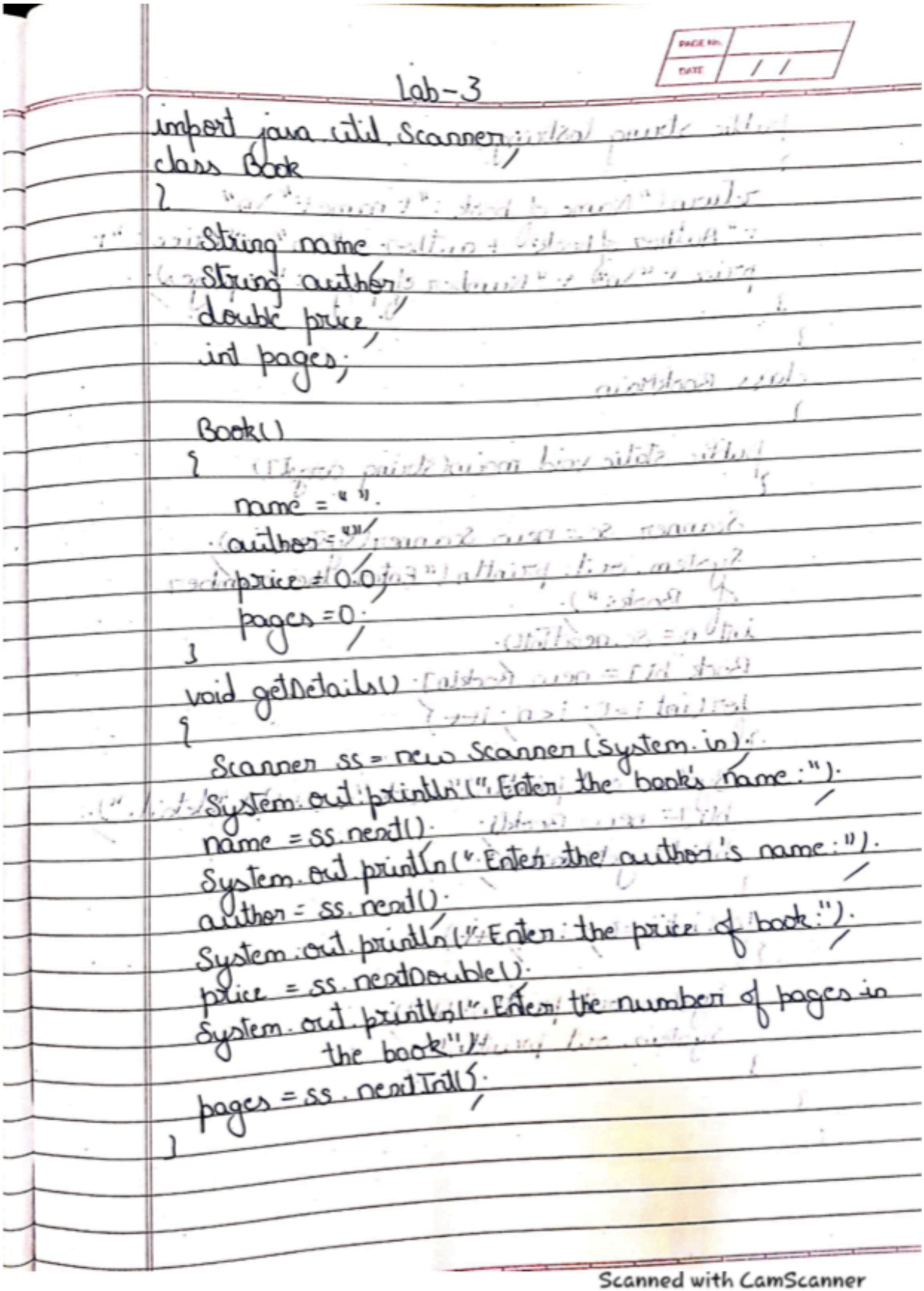
```
void cal_cgpa()
{
  double sum=0.0;
  for(int i=0; i<marks.length; i++)
  {
    if(marks[i]>=90 && marks[i]<=100)
    {
      sum+=10*credits[i];
    }
    else if(marks[i]>=80 && marks[i]<90)
    {
      sum+=9*credits[i];
    }
    else if(marks[i]>=70 && marks[i]<=80)
    {
      sum+=8*credits[i];
    }
    else if(marks[i]>=60 && marks[i]<=50)
    {
      sum+=7*credits[i];
    }
    else if(marks[i]>=50 && marks[i]<60)
    {
      sum+=6*credits[i];
    }
    else if(marks[i]>=40 && marks[i]<50)
    {
      sum+=5*credits[i];
    }
    else if(marks[i]<40)
    {
      sum+=0;
    }
  }
}
```

```
        int credit_sum=0;
        for(int i=0; i<credits.length; i++)
        {
            credit_sum+=credits[i];
        }
        cgpa = (double)sum/credit_sum;
    }
    void printData()
    {
        System.out.println("Student Details:");
        System.out.println("Student name:"+name);
        System.out.println("Student usn:"+usn);
        System.out.println("Student CGPA:"+cgpa);
    }
}
class StudentMain
{
    public static void main(String args[])
    {
        Student s1=new Student();
        s1.getData();
        s1.cal_cgpa();
        s1.printData();
    }
}
```


Desktop — -bash — 80×24
Ishas-MacBook-Air:Desktop isha$ javac Lab2.java
Ishas-MacBook-Air:Desktop isha$ java StudentMain
Enter the Name and USN of student respectively
Isha 1BM19EC057
Enter the number of Subjects:
5
Enter the number 1 subject marks and credit respectively
95 5
Enter the number 2 subject marks and credit respectively
94 4
Enter the number 3 subject marks and credit respectively
93 4
Enter the number 4 subject marks and credit respectively
87 4
Enter the number 5 subject marks and credit respectively
90 3
Student Details:
Student name: Isha
Student USN: 1BM19EC057
Student CGPA: 9.8
Ishas-MacBook-Air:Desktop isha$

Lab Program - 3

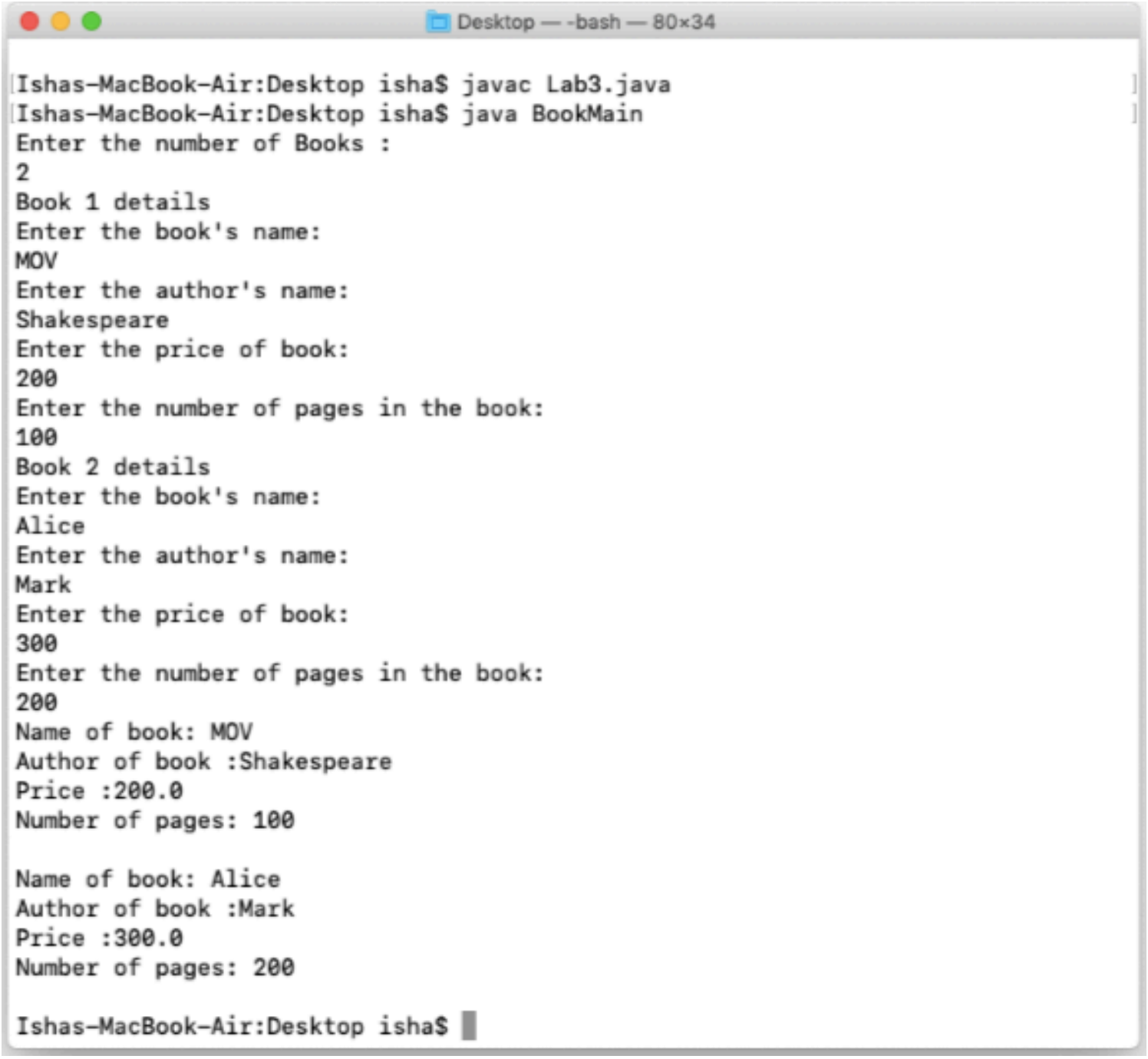
Create a class Book which contains four members: name, author, price, num_pages. Include a constructor to set the values for the members. Include methods to set and get the details of the objects. Include a toString( ) method that could display the complete details of the book. Develop a Java program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



Lab-3

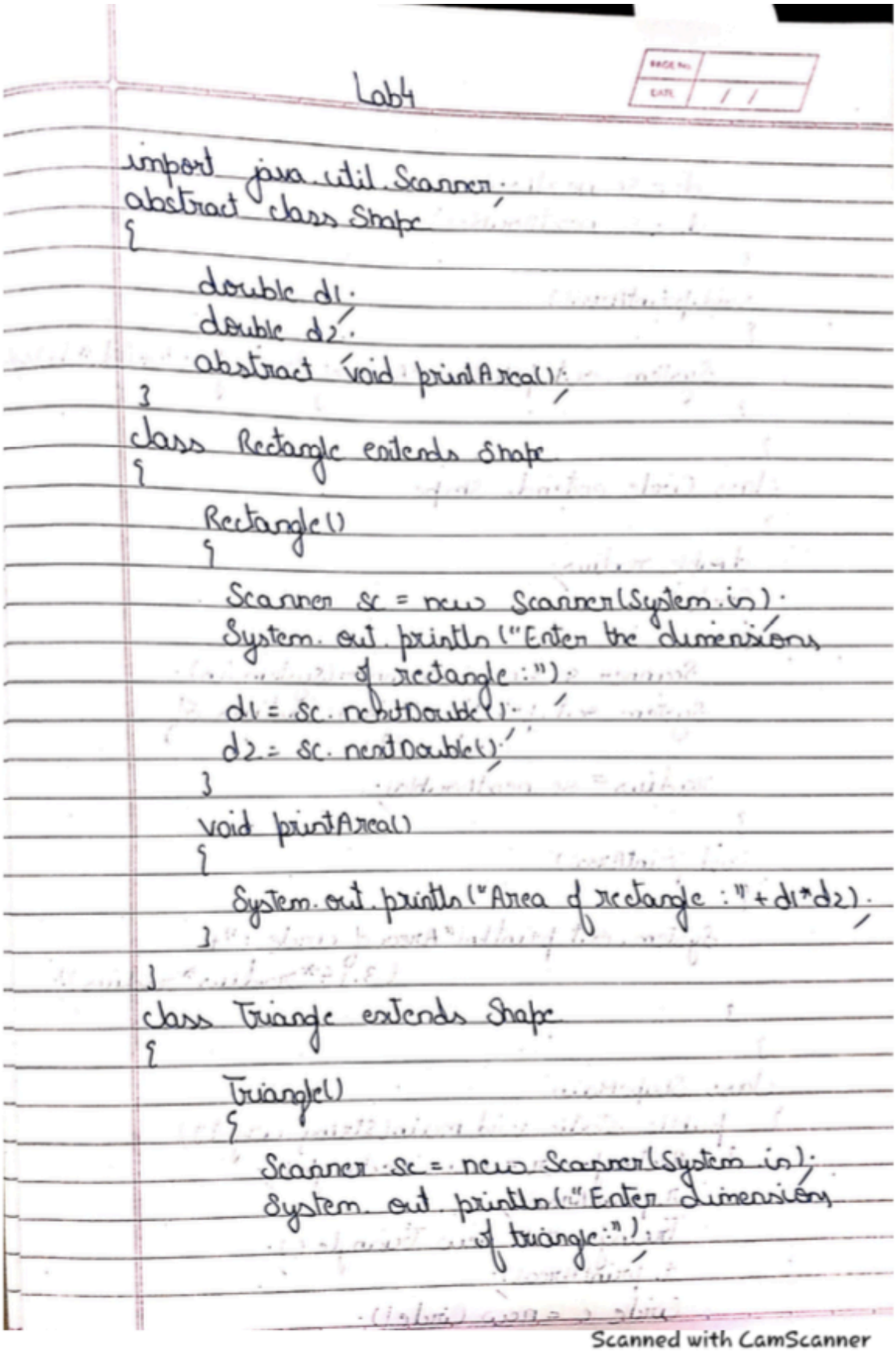
```
import java.util.Scanner;
class Book
{
  String name;
  String author;
  double price;
  int pages;

  Book()
  {
    name = " ";
    author = " ";
    price = 0.0;
    pages = 0;
  }
  void getDetails()
  {
    Scanner ss = new Scanner(System.in);
    System.out.println("Enter the book's name:");
    name = ss.next();
    System.out.println("Enter the author's name:");
    author = ss.next();
    System.out.println("Enter the price of book:");
    price = ss.nextDouble();
    System.out.println("Enter the number of pages in
          the book");
    pages = ss.nextInt();
  }
```

```
public String toString()
{
  return("Name of book : " + name + "\n"
  + "Author of book" + auther + "\n" + "Price : "+
  price + "\n" + "Number of pages : " + pages);
}
}
class BookMain
{
  public static void main(String args[])
  {
   Scanner sc = new Scanner(System.in);
   System.out.println("Enter the number
   of Books");
   int n = sc.nextInt();
   Book bl[] = new Book[n];
   for(int i=0; i<n; i++)
   {
    System.out.println("Book " + (i+1) + "details");
    bl[i] = new Book();
    bl[i] = getDetails();
   }
   for(int i=0; i<n; i++)
   {
    System.out.println(bl[i]);
    System.out.println();
   }
}
}
```


Desktop — -bash — 80×34
Ishas-MacBook-Air:Desktop isha$ javac Lab3.java
Ishas-MacBook-Air:Desktop isha$ java BookMain
Enter the number of Books :
2
Book 1 details
Enter the book's name:
MOV
Enter the author's name:
Shakespeare
Enter the price of book:
200
Enter the number of pages in the book:
100
Book 2 details
Enter the book's name:
Alice
Enter the author's name:
Mark
Enter the price of book:
300
Enter the number of pages in the book:
200
Name of book: MOV
Author of book :Shakespeare
Price :200.0
Number of pages: 100
Name of book: Alice
Author of book :Mark
Price :300.0
Number of pages: 200
Ishas-MacBook-Air:Desktop isha$

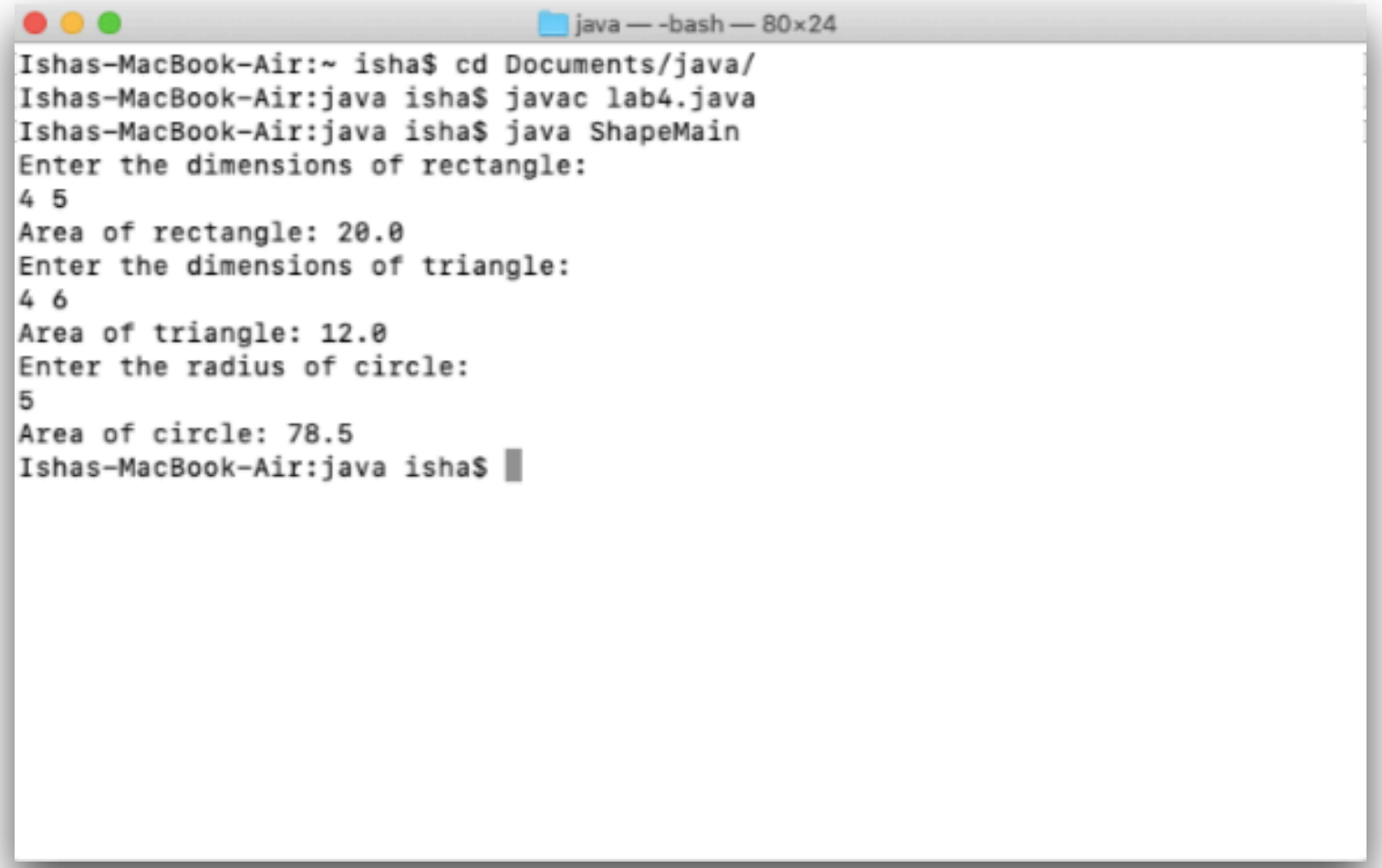
Lab Program-4

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.



```
Lab4

import java.util.Scanner;
abstract class Shape
{
    double d1;
    double d2;
    abstract void printArea();
}
class Rectangle extends Shape
{
    Rectangle()
    {
      Scanner sc = new Scanner(System.in);
      System.out.println("Enter the dimensions
                 of rectangle :");
      d1 = sc.nextDouble();
      d2 = sc.nextDouble();
    }
    void printArea()
    {
      System.out.println("Area of rectangle :"+d1*d2);
    }
}
class Triangle extends Shape
{
    Triangle()
    {
      Scanner sc = new Scanner(System.in);
      System.out.println("Enter dimensions
                 of triangle:");
```

```
        d1 = sc.nextDouble();
        d2 = sc.nextDouble();
    }
    void printArea()
    {
        System.out.println("Area of triangle : "+(d1*d2)/2);
    }
}
class Circle extends Shape
{
    double radius;
    Circle()
    {
        Scanner sc = new Scanner(System.in);
        System.out.println("Enter radius of
                            circle :");
        radius = sc.nextDouble();
    }
    void printArea()
    {
        System.out.println("Area of circle :"+
                            (3.14*radius*radius));
    }
}
class ShapeMain
{   public static void main(String args[])
    {   Rectangle r = new Rectangle();
        r.printArea();
        Triangle t = new Triangle();
        t.printArea();
        Circle c = new Circle();
        C.printArea();
    }
}
```


java — -bash — 80×24
Ishas-MacBook-Air:~ isha$ cd Documents/java/
Ishas-MacBook-Air:java isha$ javac lab4.java
Ishas-MacBook-Air:java isha$ java ShapeMain
Enter the dimensions of rectangle:
4 5
Area of rectangle: 20.0
Enter the dimensions of triangle:
4 6
Area of triangle: 12.0
Enter the radius of circle:
5
Area of circle: 78.5
Ishas-MacBook-Air:java isha$

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

Page No.
Date: / /

Lab5

```
import java.util.Scanner;
class account
{
  String acc_name;
  int acc_num;
  String acc_type;
  double balance;
}
class sav_acct extends account
{
  Scanner sc = new Scanner(System.in);
  double cmp;
  sav_acct()
  {
    System.out.println("Enter the account name:");
    acc_name = sc.next();
    System.out.println("Enter the account number:");
    acc_num = sc.nextInt();
    System.out.println("Enter the balance:");
    balance = sc.nextDouble();
  }
  void deposit()
  {
    double amt;
    System.out.println("Enter the amount to deposit:");
    amt = sc.nextDouble();
    balance += amt;
  }
```

```
void cmp_int()
{
    int time.
    System.out.println("Enter the time period elapsed");
    time = sc.nextInt().
    System.out.println("Enter the rate of C.I").
    int rate = sc.nextInt();
    cmp = balance.
    balance = balance*(Math.pow((1+(rate*0.01)),time);
    cmp = balance - cmp.
    System.out.println("Compound Interest :"+cmp).
    System.out.println("Balance after depositing
    interest :" + balance).
}
void withdraw()
{
    double amt;
    System.out.println("Enter the amount to be
    withdrawn");
    amt = sc.nextDouble();
    if(balance>=amt)
    {
        balance -=amt.
        System.out.println("Your amount after
        withdrawl is :" +balance);
    }
    else
    {
        System.out.println("The given amount cannot
        be withdrawn");
    }
}
```

```
void disp()
{
    System.out.println("balance amount :"+balance);
}
}
class curr_acc extends account
{
    Scanner sc = new Scanner(System.in);
    double min_bal;
    double penalty;
    curr_acc()
    {
        System.out.println("Enter the account name :");
        acc_name = sc.next();
        System.out.println("Enter the account number:");
        acc_num= sc.nextInt();
        System.out.println("Enter the balance:");
        balance = sc.nextDouble();
    }
    void deposit()
    {
        double amt;
        System.out.println("Enter the amount to deposit :");
        amt = sc.nextDouble();
        balance += amt;
    }
```

```
void minimum()
{
  System.out.println("Enter the minimum balance
  allowed and service charge percentage");
  min_bal = sc.nextDouble();
  penalty = sc.nextDouble();

  if(balance < min_bal)
  {
    System.out.println("Your balance is less
    than minimum amount");
    balance = balance - ((min_bal - balance)
                  * penalty * 0.01);
    System.out.println("Your new total balance
      is" + balance);
  }
}
void withdraw()
{
  double amt;
  System.out.println("Enter the amount to be
    withdrawn:");
  amt = sc.nextDouble();
  if(balance >= amt)
  {
    balance -= amt;
    System.out.println("Your amount after
    withdrawl is" + balance);
  }
  else{
    System.out.println("The given amount
    cannot be withdrawn");
  }
}
```

```
void disp()
{
    System.out.println("balance amount:" + balance);
}
}

class accMain
{
    public static void main(String args[])
    {
        Scanner sc = new Scanner(System.in);
        System.out.println("Enter the account type
        write 1 for savings and 2 for current");
        int acc_type = sc.nextInt();
        if(acc_type==1)
        {
            sav_acct o2 = new sav_acct();
            while(true)
            {
                System.out.println("1.deposit \n 2.Display
                Balance \n 3. Withdraw Amount \n 4. Check
                for Compound Interest");
                int choice = sc.nextInt();
                switch(choice)
                {
                    case 1: o2.deposit();
                            break;
                    case 2: o2.disp()
                            break;
                    case 3: o2.withdraw();
                            break;
                    case 4: o2.cmp_int();
                            break;
```

```
            default: System.exit(0);
        }
    }
}
else if (acc_type == 2)
{
    curr_acc o3 = new curr_acc();
    while (true)
    {
        System.out.println("1. Deposit \n 2. Display
        balance \n 3. Withdraw Amount \n 4. Check
        for minimum balance and penalty");
        int choice = sc.nextInt();
        switch (choice)
        {
            case 1: o3.deposit();
                    break;
            case 2: o3.displ();
                    break;
            case 3: o3.withdraw();
                    break;
            case 4: o3.minimum()
                    break;
            default: System.exit(0);
        }
    }
}
}
```


java — java accMain — 62×42
Ishas-MacBook-Air:~ isha$ cd Documents/java/
Ishas-MacBook-Air:java isha$ javac lab5.java
Ishas-MacBook-Air:java isha$ java accMain
Enter the account type, write 1 for savings and 2 for current:
1
Enter the account name:
Isha
Enter the account number:
123
Enter the balance:
2000
1.Deposit
2.Display Balance
3.Withdraw Amount
4.Check for compound interest 5.Exit
1
Enter the amount to deposit:
200
1.Deposit
2.Display Balance
3.Withdraw Amount
4.Check for compound interest 5.Exit
2
balance amount:2200.0
1.Deposit
2.Display Balance
3.Withdraw Amount
4.Check for compound interest 5.Exit
3
Enter the amount to be withdrawn:
500
Your amount after withdrawl is: 1700.0
1.Deposit
2.Display Balance
3.Withdraw Amount
4.Check for compound interest 5.Exit
4
Enter the time period elapsed:

```
java — java accMain — 62×42
Enter the time period elapsed:
4
Enter the rate of CI
8
Compound Interest:612.8312320000005
Balance after depositing interest:2312.8312320000005

1.Deposit
 2.Display Balance
 3.Withdraw Amount
 4.Check for compound interest 5.Exit
5
Ishas-MacBook-Air:java isha$ java accMain
Enter the account type, write 1 for savings and 2 for current:
2
Enter the account name:
Isha
Enter the account number:
456
Enter the balance:
2000

1.Deposit
 2.Display Balance
 3.Withdraw Amount
 4.Check for minimum balance and penalty
1
Enter the amount to deposit:
600

1.Deposit
 2.Display Balance
 3.Withdraw Amount
 4.Check for minimum balance and penalty
2
balance amount:2600.0

1.Deposit
 2.Display Balance
 3.Withdraw Amount
 4.Check for minimum balance and penalty
3
```

java — java accMain — 62×42

```
2000

1.Deposit
 2.Display Balance
 3.Withdraw Amount
 4.Check for minimum balance and penalty
1
Enter the amount to deposit:
600

1.Deposit
 2.Display Balance
 3.Withdraw Amount
 4.Check for minimum balance and penalty
2
balance amount:2600.0

1.Deposit
 2.Display Balance
 3.Withdraw Amount
 4.Check for minimum balance and penalty
3
Enter the amount to be withdrawn:
1700
Your amount after withdrawl is: 900.0

1.Deposit
 2.Display Balance
 3.Withdraw Amount
 4.Check for minimum balance and penalty
4
Enter the minimum balance allowed and the service charge perce
ntage
1200 5
Your balance is less than minimum amount
Your new total balance is885.0

1.Deposit
 2.Display Balance
 3.Withdraw Amount
 4.Check for minimum balance and penalty
```