Program 1:

```
import java.util.*;
class lab3_1
{
	public static void main(String args[])
	{
		int a,b,c,d,f=0;
		Scanner scr=new Scanner(System.in);
		System.out.println("\nEnter the values of a ,b ,c : ");
		a=scr.nextInt();
		b=scr.nextInt();
		c=scr.nextInt();
		d=(b*b)-(4*a*c);
		if(d==0)
		{
			System.out.println("Roots are real and Equal");
			f=1;
		}
		else if(d>0)
		{
			System.out.println("Roots are real and UnEqual");
			f=1;
		}
		else
		System.out.println("Roots are imaginary");
		if(f==1)
```

```
            {
                float r1=(float)(-b+Math.sqrt(d))/(2*a);
                float r2=(float)(-b-Math.sqrt(d))/(2*a);
                System.out.println("Roots are :   "+r1+" ,"+r2);
            }
        }
}
```

Output:

```
Microsoft Windows [Version 10.0.19041.388]
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C:\Users\dell\OneDrive\Desktop\java\lab assignments>javac lab3_1.java

C:\Users\dell\OneDrive\Desktop\java\lab assignments>java lab3_1

Enter the values of a ,b ,c :
1
2
3
Roots are imaginary

C:\Users\dell\OneDrive\Desktop\java\lab assignments>java lab3_1

Enter the values of a ,b ,c :
1
8
2
Roots are real and UnEqual
Roots are :   -0.25834262 ,-7.7416573

C:\Users\dell\OneDrive\Desktop\java\lab assignments>java lab3_1

Enter the values of a ,b ,c :
-6
5
2
Roots are real and UnEqual
Roots are :   -0.29533365 ,1.128667

C:\Users\dell\OneDrive\Desktop\java\lab assignments>
```
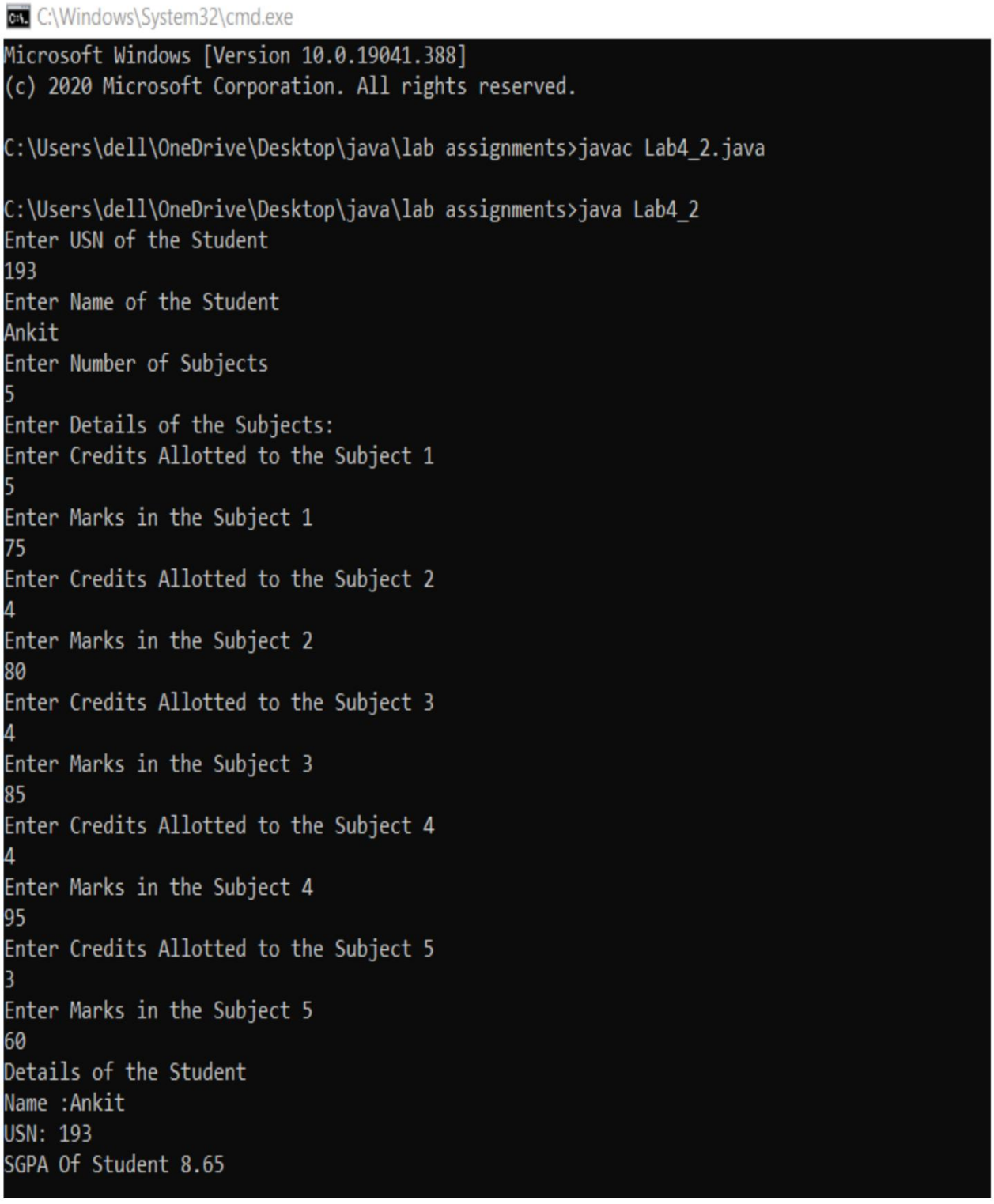

Program 2:

```
import java.util.Scanner;
class Student
{
 String USN;
 String name;
 int n;
 double SGPA = 0;
 int totalCredits = 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 Number of Subjects");
 n = ss.nextInt();
 int credits[] = 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 + (7*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/totalCredits));
 }
}

public class Lab4_2
{
 public static void main(String args[])
 {
  Student s1 = new Student();
  s1.Details();
  s1.Display();
 }
}
```

Output:


C:\Windows\System32\cmd.exe
Microsoft Windows [Version 10.0.19041.388]
(c) 2020 Microsoft Corporation. All rights reserved.
C:\Users\dell\OneDrive\Desktop\java\lab assignments>javac Lab4_2.java
C:\Users\dell\OneDrive\Desktop\java\lab assignments>java Lab4_2
Enter USN of the Student
193
Enter Name of the Student
Ankit
Enter Number of Subjects
5
Enter Details of the Subjects:
Enter Credits Allotted to the Subject 1
5
Enter Marks in the Subject 1
75
Enter Credits Allotted to the Subject 2
4
Enter Marks in the Subject 2
80
Enter Credits Allotted to the Subject 3
4
Enter Marks in the Subject 3
85
Enter Credits Allotted to the Subject 4
4
Enter Marks in the Subject 4
95
Enter Credits Allotted to the Subject 5
3
Enter Marks in the Subject 5
60
Details of the Student
Name :Ankit
USN: 193
SGPA Of Student 8.65

```
C:\Users\dell\OneDrive\Desktop\java\lab assignments>java Lab4_2
Enter USN of the Student
056
Enter Name of the Student
Sanket
Enter Number of Subjects
2
Enter Details of the Subjects:
Enter Credits Allotted to the Subject 1
5
Enter Marks in the Subject 1
25
Failed In Subject 1
Enter Credits Allotted to the Subject 2
4
Enter Marks in the Subject 2
80
Details of the Student
Name :Sanket
USN: 056
SGPA Of Student 4.0

C:\Users\dell\OneDrive\Desktop\java\lab assignments>
```

Program 3:

```
import java.util.*;
import java.lang.*;
class Book {
        String name, author;
        double price;
        int num_pages;
        Scanner in = new Scanner(System.in);

        Book() {
                System.out.println("Enter name of book: ");
                name = in.nextLine();

                System.out.println("Enter name of author: ");
                author = in.nextLine();

                System.out.println("Enter price of book in Rs: ");
                price = in.nextDouble();

                System.out.println("Enter number of pages in the book: ");
                num_pages = in.nextInt();
        }

        void show() {
                System.out.println("Name: " + name);
                System.out.println("Author: " + author);
                System.out.println("Price: " + price);
```

```
            System.out.println("Number of pages: " + num_pages);
        }

        public String toString() {
            return name + ", By " + author + " for Rs." + price + " and has " + num_pages + "
pages";
        }

        public static void main(String[] args) {

            Scanner in = new Scanner(System.in);

            int n, x;

            System.out.println("Enter number of books to be created: ");
            n = in.nextInt();

            Book B[] = new Book[n];

            for(int i = 0; i < n; i++) {
                System.out.println("Book " + (i+1));
                B[i] = new Book();
                System.out.println();
            }

            for(int i = 0; i < n; i++) {
                System.out.println("Book " + (i+1));
```

```
                System.out.println(B[i]);
                System.out.println();
            }
            do {
                System.out.println("Enter the book number whose details you want to
display: ");
                x = in.nextInt();
            } while(x < 1 && x > n);
            B[x-1].show();

        }
}
```

Output :

```
C:\Users\dell\OneDrive\Desktop\java>javac Book.java

C:\Users\dell\OneDrive\Desktop\java>java Book
Enter number of books to be created:
2
Book 1
Enter name of book:
2 States
Enter name of author:
Chetan Bhagat
Enter price of book in Rs:
299
Enter number of pages in the book:
556

Book 2
Enter name of book:
The Boy who loved
Enter name of author:
Durjoy Datta
Enter price of book in Rs:
499
Enter number of pages in the book:
823

Book 1
2 States, By Chetan Bhagat for Rs.299.0 and has 556 pages

Book 2
The Boy who loved, By Durjoy Datta  for Rs.499.0 and has 823 pages

Enter the book number whose details you want to display:
1
Name: 2 States
Author: Chetan Bhagat
Price: 299.0
Number of pages: 556

C:\Users\dell\OneDrive\Desktop\java>
```

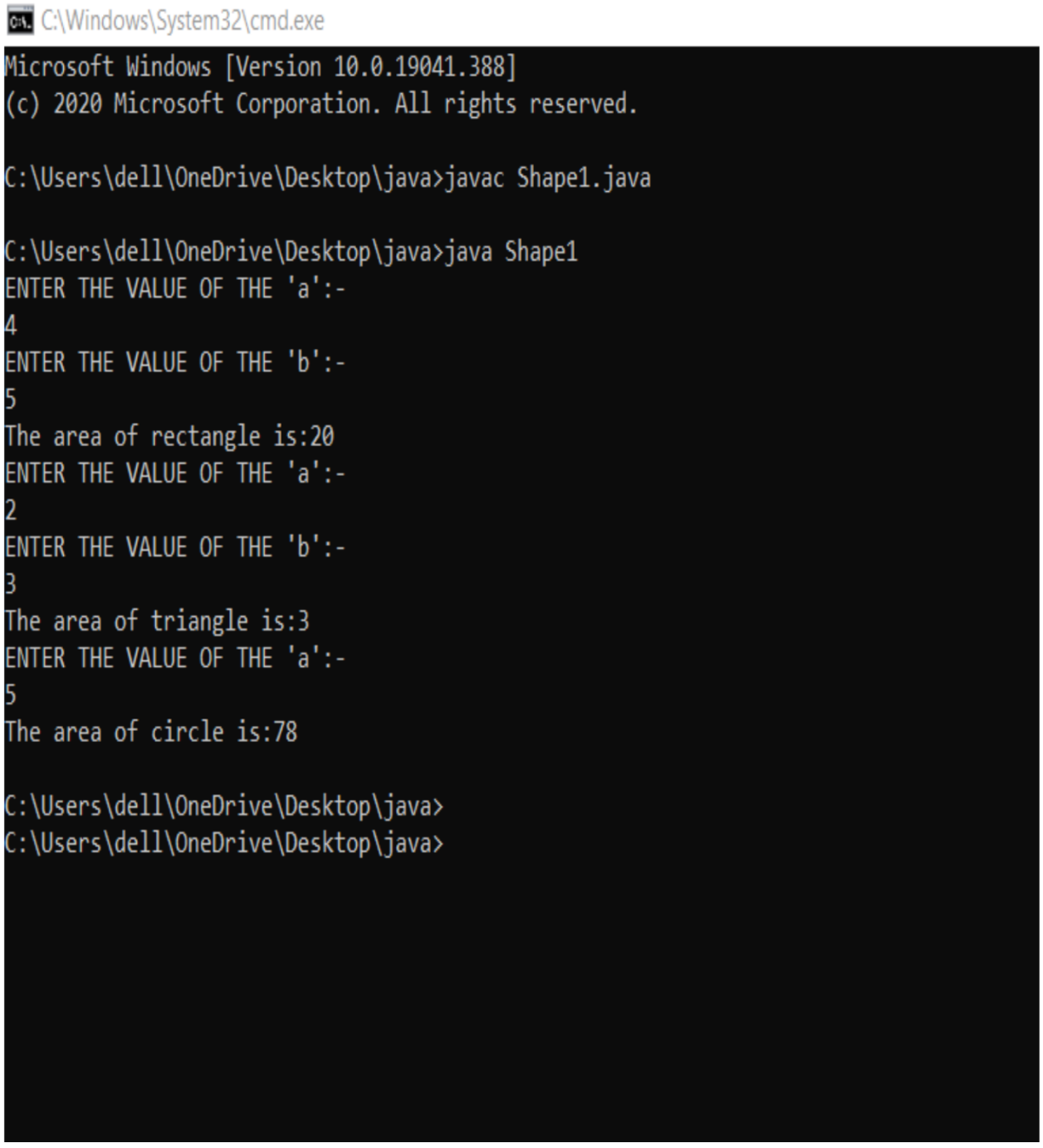
Program 4:

```
import java.util.*;
import java.lang.*;

abstract class shape
{
    int a,b;
    abstract public void print_area();

}
class rectangle extends shape
{
 public int area_rect;
      @Override
 public void print_area()
 {
       Scanner ss= new Scanner(System.in);
      System.out.println("ENTER THE VALUE OF THE 'a':-");
       a=ss.nextInt();
      System.out.println("ENTER THE VALUE OF THE 'b':-");
      int   b=ss.nextInt();
       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()
 {
 Scanner ss= new Scanner(System.in);
      System.out.println("ENTER THE VALUE OF THE 'a':-");
       a=ss.nextInt();
      System.out.println("ENTER THE VALUE OF THE 'b':-");
        b=ss.nextInt();
  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()
 {
 Scanner ss= new Scanner(System.in);
```

```
        System.out.println("ENTER THE VALUE OF THE 'a':-");
         a=ss.nextInt();

  area_circle=(int) (3.14*a*a);
              System.out.println("The area of circle is:"+area_circle);
 }
}
public class Shape1 {

    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();

    }

}
```

Output :


C:\Windows\System32\cmd.exe
Microsoft Windows [Version 10.0.19041.388]
(c) 2020 Microsoft Corporation. All rights reserved.
C:\Users\dell\OneDrive\Desktop\java>javac Shape1.java
C:\Users\dell\OneDrive\Desktop\java>java Shape1
ENTER THE VALUE OF THE 'a':-
4
ENTER THE VALUE OF THE 'b':-
5
The area of rectangle is:20
ENTER THE VALUE OF THE 'a':-
2
ENTER THE VALUE OF THE 'b':-
3
The area of triangle is:3
ENTER THE VALUE OF THE 'a':-
5
The area of circle is:78
C:\Users\dell\OneDrive\Desktop\java>
C:\Users\dell\OneDrive\Desktop\java>

Program 5:

```
import java.util.*;
import java.lang.*;

class Account {

        String name, abc;
        int accNo;
        char accType;
        double bal = 0;
        double deposit;
        Scanner in = new Scanner(System.in);

        void input_data() {

                System.out.println("Enter your account type (S/C):");
                abc = in.nextLine();
                accType = abc.charAt(0);
        }

        void deposit() {

                System.out.println("Enter an amount to deposit: ");
                deposit = in.nextDouble();

                bal += deposit;
```

```
        System.out.println("Balance has been updated. ");
}

void view_balance() {

        System.out.println("Balance = " + bal);
}

public static void main(String[] args) {

        Scanner s = new Scanner(System.in);
        int x;
        Account a1 = new Account();
        a1.input_data();

        if(a1.accType == 'C' || a1.accType == 'c'){

                Current a2 = new Current();

                do {
                        System.out.println("WELCOME TO YOUR CURRENT ACCOUNT");
                        System.out.println("1. Deposit ");
                        System.out.println("2. Check Balance ");
                        System.out.println("3. Issue Cheque ");
                        System.out.println("4. Exit");
                        System.out.println("Enter your choice: ");
                        x = s.nextInt();
```

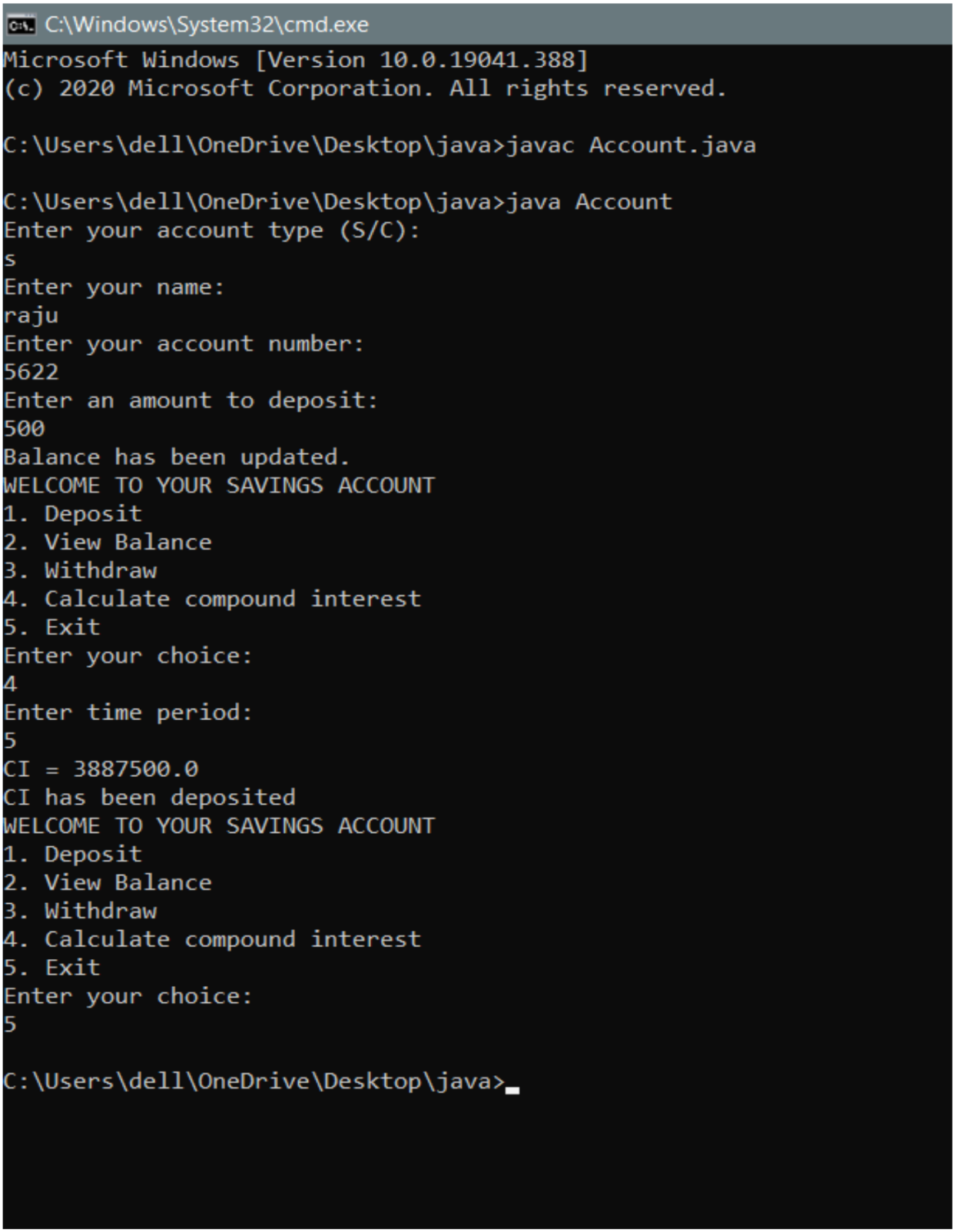
```
                switch(x) {
                        case 1: a2.deposit();
                        break;
                        case 2: a2.check_balance();
                        break;
                        case 3: a2.issue_cheque();
                        break;
                        case 4: System.exit(0);
                        break;
                        default: System.out.println("ERROR. INVALID CHOICE.");
                }

        } while(x <= 4 && x >= 1);
}
else if (a1.accType == 'S' || a1.accType == 's'){

        Savings a3 = new Savings();

        do {
                System.out.println("WELCOME TO YOUR SAVINGS ACCOUNT");
                System.out.println("1. Deposit");
                System.out.println("2. View Balance");
                System.out.println("3. Withdraw ");
                System.out.println("4. Calculate compound interest ");
                System.out.println("5. Exit ");
                System.out.println("Enter your choice: ");
```

```
                    x = s.nextInt();

                    switch(x) {
                        case 1: a3.deposit();
                        break;
                        case 2: a3.view_balance();
                        break;
                        case 3: a3.withdraw_balance();
                        break;
                        case 4: a3.compute_CI();
                        break;
                        case 5: System.exit(0);
                        break;
                        default: System.out.println("ERROR. INVALID CHOICE.");
                    }


                } while(x <= 5 && x >=1);
            }
            else System.out.println("INVALID ACCOUNT TYPE");
        }
}

class Current extends Account {

    Current() {
```

```
        System.out.println("Enter your name: ");
        name = in.nextLine();

        System.out.println("Enter your account number: ");
        accNo = in.nextInt();

        deposit();
}

double chq_amount;

void issue_cheque() {

        System.out.println("Enter amount for which cheque is to be issued.");
        chq_amount = in.nextDouble();
        if(chq_amount > bal) {
                System.out.println("ERROR! Insufficient balance in account.");
        }
        else {
                bal -= chq_amount;
                System.out.println("Cheque has been issued SUCCESSFULLY");
        }
}


void check_balance() {
```

```
                if(bal < 1000) {

                        System.out.println("Current available balance is lesser than minimum
required balance.");
                        bal -= 100;
                        System.out.println("Service charge of Rs.100 has been deducted from
your balance.");
                }
                view_balance();
        }
}

class Savings extends Account {

        double CI, withdrawal_ammount, time;

        Savings() {

                System.out.println("Enter your name: ");
                name = in.nextLine();

                System.out.println("Enter your account number: ");
                accNo = in.nextInt();

                deposit();
        }

        void compute_CI() {
```

```
            System.out.println("Enter time period: ");
            time = in.nextInt();
            CI = (bal*(Math.pow(6, time))) - bal;
            System.out.println("CI = " + CI);
            bal += CI;
            System.out.println("CI has been deposited");
        }

        void withdraw_balance() {

            System.out.println("Enter the amount you want to withdraw: ");
            withdrawal_ammount = in.nextDouble();

            if(withdrawal_ammount > bal) {
                System.out.println("ERROR! THE ENTERED AMOUNT IS GREATER THAN
THE AVAILABLE BALANCE...");
            }
            else {
                bal -= withdrawal_ammount;
                System.out.println("AMOUNT HAS SUCCESSFULLY BEEN WITHDRAWN!");
            }
        }

}
```


C:\Windows\System32\cmd.exe
Microsoft Windows [Version 10.0.19041.388]
(c) 2020 Microsoft Corporation. All rights reserved.
C:\Users\dell\OneDrive\Desktop\java>javac Account.java
C:\Users\dell\OneDrive\Desktop\java>java Account
Enter your account type (S/C):
s
Enter your name:
raju
Enter your account number:
5622
Enter an amount to deposit:
500
Balance has been updated.
WELCOME TO YOUR SAVINGS ACCOUNT
1. Deposit
2. View Balance
3. Withdraw
4. Calculate compound interest
5. Exit
Enter your choice:
4
Enter time period:
5
CI = 3887500.0
CI has been deposited
WELCOME TO YOUR SAVINGS ACCOUNT
1. Deposit
2. View Balance
3. Withdraw
4. Calculate compound interest
5. Exit
Enter your choice:
5
C:\Users\dell\OneDrive\Desktop\java>