

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 quadraticequation
{
    public static void main(String args[])
    {
        Scanner S = new Scanner(System.in);
        System.out.println("Enter the values of a b and
c"); double a,b,c,d,r1,r2; a=S.nextFloat();
        if(a==0)
        {
            System.out.println("invalid input");
        }
        else
        {
            b=S.nextFloat();
            c=S.nextFloat(); d=(b*b)-
(4*a*c);

            if(d>0)
            {
                r1=(-b+Math.pow(d,0.5))/(2*a); r2=(-b-
Math.pow(d,0.5))/(2*a);

                System.out.println(" Roots are Real and Distinct and The values are: " + r1 + "and" +
r2);
            }
            else if(d==0)
            {
                r1=-b/(2*a);
                System.out.println("Roots are Equal and the values are " + r1);
            }
        }
    }
}
```

```

        r1=-b/(2*a);
        r2=(Math.sqrt(Math.abs(d)))/(2*a);
        System.out.println("Roots are not real and the values are " + r1 + "+i" +Math.abs(r2)+
"and" + r1+ "-i" +Math.abs(r2));
    }
}
}
}

```

Observation:

PROGRAM 1

QUADRATIC EQUATIONS

```

import java.util.Scanner;
import java.util.Scanner;
import java.util.Scanner;
class QuadraticEquation {
    public static void main (String args[])
    {
        Scanner S = new Scanner (System.in);
        System.out.println ("Enter the values a, b and c");
        double a,b,c,d,r1,r2;
        a = S.nextDouble();
        if (a==0) System.out.println ("invalid input");
        b = S.nextDouble();
        c = S.nextDouble();
        d = (b*b)-(4*a*c);
        if (d>0)
        {
            r1 = (-b + sqrt(d))/(2*a);
            r2 = (-b - sqrt(d))/(2*a);
            System.out.println ("Roots are " + r1 + " and " + r2);
        }
        else if (d==0)
        {
            r1 = -b / (2*a);
        }
    }
}

```

system.out.Println ("Roots are equal and value is " + r1);
else {
 r1 = b/(2*a);
 r2 = (Math.sqrt(Math.abs(d)))/(2*a);
 System.out.Println ("Roots are not real and the values are " + r1 + "+i" +Math.abs(r2)+ "and" + r1+ "-i" +Math.abs(r2)); } } }

Output:
Enter the values of a b and c
2 4 9
Roots are Equal and the values are -1
Enter the values of a b and c
1 5 6
Roots are Real and Distinct and the values are -2 and -3.
Enter the values of a b and c
1 2 3
Roots are not Real
~~(b + sqrt(d)) / (2 * a)~~ ~~(b - sqrt(d)) / (2 * a)~~
~~(b + sqrt(d)) / (2 * a)~~ ~~(b - sqrt(d)) / (2 * a)~~
~~(b + sqrt(d)) / (2 * a)~~ ~~(b - sqrt(d)) / (2 * a)~~

Output:

```
Microsoft Windows [Version 10.0.19044.1706]
(c) Microsoft Corporation. All rights reserved.

C:\Users\bmsce>cd C:\User\bmsce\Desktop\IBM21CS065
C:\Users\bmsce\Desktop\IBM21CS065>set path="C:\Program Files\Java\jdk1.8.0_201\bin"
C:\Users\bmsce\Desktop\IBM21CS065>javac quadraticequation.java
C:\Users\bmsce\Desktop\IBM21CS065>java quadraticequation
Enter the values of a b and c
1 5 6
Roots are Real and Distinct and The values are: -2.0and-3.0
C:\Users\bmsce\Desktop\IBM21CS065>java quadraticequation
Enter the values of a b and c
2 4 2
Roots are Equal and the values are -1.0
C:\Users\bmsce\Desktop\IBM21CS065>java quadraticequation
Enter the values of a b and c
1 2 3
Roots are not real and the values are -1.0+11.4142135623730951and-1.0-11.4142135623730951
C:\Users\bmsce\Desktop\IBM21CS065>
```

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.

```
import java.util.Scanner;
class student
{
    student(){}
    String name;
    String usn;
    double result=0;
    int credits[]={};
    int marks[]={};
    int total=0;

    void accept()
    {
        Scanner s=new Scanner(System.in);

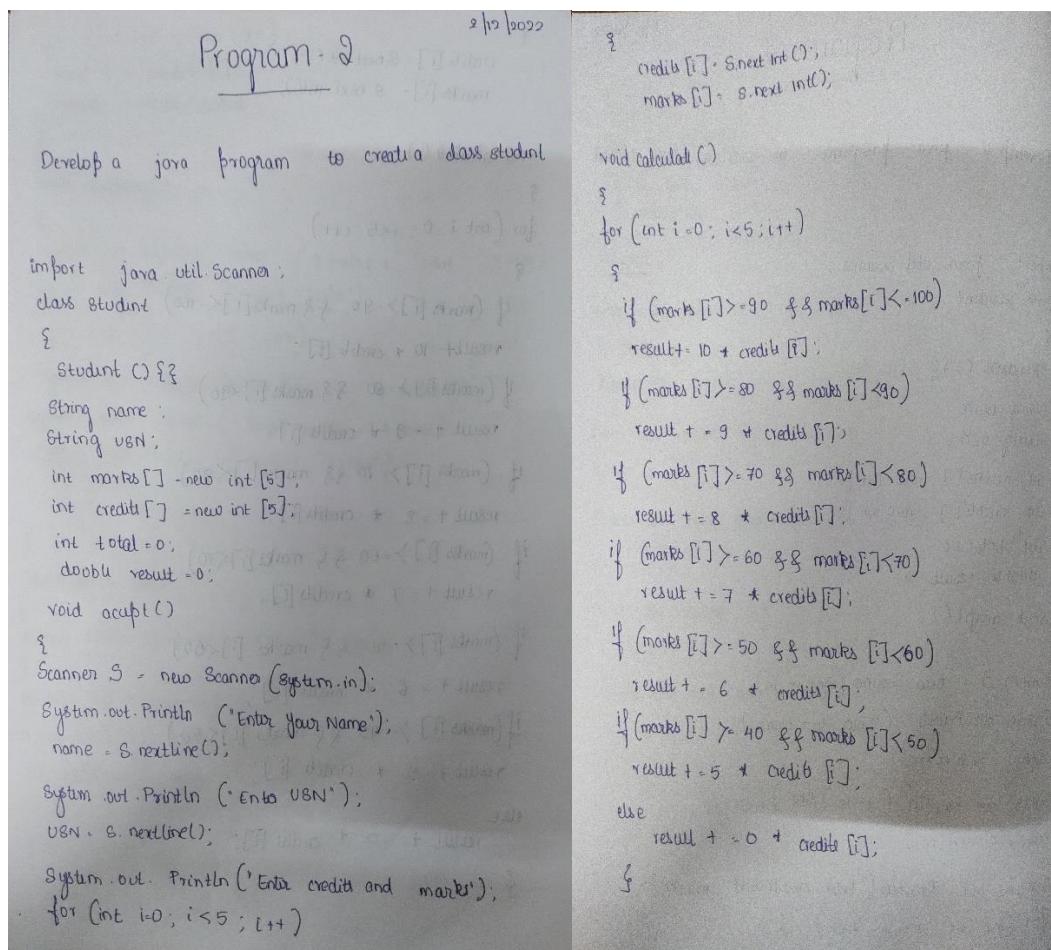
        System.out.println("Enter your Name ");
        name=s.nextLine();
        System.out.println("Enter USN ");
        usn=s.nextLine();
        System.out.println("Enter credits and marks of each subject respectively ");
        for(int i=0;i<3;i++)
        {
            this.credits[i]=s.nextInt();
            this.marks[i]=s.nextInt();
        }
    }

    void calculate()
    {
        for(int i=0;i<3;i++)
        {
            if(marks[i]>=90 && marks[i]<=100)
                result+=10*credits[i];
            if(marks[i]>=80 && marks[i]<90)
                result+=9*credits[i];
            if(marks[i]>=70 && marks[i]<80)
                result+=8*credits[i];
            if(marks[i]>=60 && marks[i]<70)
                result+=7*credits[i];
        }
    }
}
```

```

if(marks[i]>=50 && marks[i]<60)
result+=6*credits[i];
if(marks[i]>=40 && marks[i]<50)
result+=5*credits[i];
else result+=0*credits[i];
}
for(int i=0;i<3;i++)
total+=credits[i];
result=result/total;
}
void display()
{
System.out.println("Name:"+name+" USN:"+usn);
System.out.println("credits Marks");
for(int i=0;i<3;i++)
System.out.println(credits[i]+" "+marks[i]);
System.out.println("Total credits="+total);
System.out.println("SGPA="+result);
}

```



```

for (int i=0 ; i<n ; i++)
    total += credits[i];
    result = result / total;

}

void display()
{
    System.out.println("Name : " + name + " USN : " + USN);
    System.out.println("credits Marks");
    for (int i=0 ; i<5 ; i++)
        System.out.println(credits[i] + " " + marks[i]);
    System.out.println("Total credits = " + total);
    System.out.println("SGPA = " + result);
}

class lab2
{
    public static void main (String [] args)
    {
        Student s1 = new Student();
        s1.accept(); s1.calculate();
        s1.display();
    }
}

/*
 * Author: Aneesh
 * Date: 01/01/2021
 */

```

Program Q - Output

Enter Your name
Gamaran

Enter Your USN
1BM21CS065

Enter credits and marks of each subject respectively

Credits	Marks
2	30
3	40
2	30

Name : gamarna USN : 1BM21CS065

Credits	Marks
2	30
3	40
2	30

Total credits = 7

SGPA = 3.14

*Neelam
8/10/2021*

Output:

```

Windows Command Prompt
Microsoft Windows [Version 10.0.19044.1706]
(c) Microsoft Corporation. All rights reserved.

C:\Users\bmsce>cd C:\Users\bmsce\Desktop\1BM21CS065

C:\Users\bmsce\Desktop\1BM21CS065>set path="C:\Program Files\Java\jdk1.8.0_201\bin"

C:\Users\bmsce\Desktop\1BM21CS065>javac student.java

C:\Users\bmsce\Desktop\1BM21CS065>java lab2
Enter your Name
gamaran
Enter USN
1bm21cs065
Enter credits and marks of each subject respectively
2 30 3 40
2 30 3 40
Name:gamaran USN:1bm21cs065
credits Marks
2      30
3      40
2      30
Total credits=7
SGPA=2.142857142857143

C:\Users\bmsce\Desktop\1BM21CS065>javac book.java

C:\Users\bmsce\Desktop\1BM21CS065>java lab_2
enter the name of the book: harry potter
enter the author's name: jk rowling
enter the number of pages in the book: 500
enter the price of the book: 450

Book details

```

```
■ Command Prompt
Microsoft Windows [Version 10.0-19044.1786]
(c) Microsoft Corporation. All rights reserved.

C:\Users\bmsecel\Desktop\IBM21CS065>cd C:\Users\bmsecel\Desktop\IBM21CS065
C:\Users\bmsecel\Desktop\IBM21CS065>set path="C:\Program Files\Java\jdk.8.0_281\bin"
C:\Users\bmsecel\Desktop\IBM21CS065>javac student.java

C:\Users\bmsecel\Desktop\IBM21CS065>java lab2
Enter your Name
prashant
Enter USN
bmseclcs065
Enter credits and marks of each subject respectively
2 30 3 48
2 30 3 48
Name:gamana USN:bmseclcs065
credits marks
2 30
3 48
3 30
Total credits=7
SGPA=2.142857142857143

C:\Users\bmsecel\Desktop\IBM21CS065>javac book.java
C:\Users\bmsecel\Desktop\IBM21CS065>java lab_2
enter the name of the book: harry potter
author: jk rowling
enter the number of pages: 500
enter the price of the book: 450
Book details
name: harry potter
author: jk rowling
number of pages: 500
price: 450.0
-----
Book details
name: harry potter
author: dan brown
number of pages: 20
price: 87.65
-----
Book details
name: harry potter
author: dan brown
number of pages: 20
price: 87.65
```

Windows Type here to search

12:44:46 02-12-2022

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.

```
import java.util.Scanner;

class Book{

    int num_pages;
    double price;
    String name;
    String author;
    Book(){
        num_pages=0;
        price=0.0;
        name="some_book";
        author="gamana";
    }
    Book(int num_pages,double price, String name, String author){
        this.num_pages=num_pages;
        this.price=price;
        this.name=name;
        this.author=author;
    }
    void set_data(int num_pages,double price, String name, String author) {
        this.num_pages=num_pages;
        this.price=price;
        this.name=name;
        this.author=author;
    }
    void get_data(){
        System.out.println("Book details\nname: "+name+"\nauthor: "+author+"\nnumber of pages:
"+num_pages+"\nprice: "+price);
        System.out.println("\n-----\n");
    }
    public String toString(){
        return ("Book details\nname: "+name+"\nauthor: "+author+"\nnumber of pages:
"+num_pages+"\nprice: "+price+"\n-----\n");
    }
}
```

```

class lab_2 {
    public static void main(String[] args) {
        Book b1=new Book();
        Scanner s=new Scanner(System.in);
        System.out.print("enter the name of the book: ");
        String name=s.nextLine();
        System.out.print("enter the author's name: ");
        String author=s.nextLine();
        System.out.print("enter the number of pages in the book: ");
        int num_pages=s.nextInt();
        System.out.print("enter the price of the book: ");
        double price=s.nextDouble();
        System.out.println();
        b1.set_data(num_pages,price,name,author);
        Book b2=new Book(20,87.65,"deception point","dan brown");
        b1.get_data();
        b2.get_data();
        System.out.println(b1);
        System.out.println(b2);
        s.close();
    }
}

```

}

}

Program-3

```

import java.util.Scanner;
class Book {
    int numPages;
    double price;
    String name;
    String author;
    Book() {
        numPages = 0;
        price = 0.0;
        name = "some book";
        author = "geman";
    }
    Book(int numPages, double price, String name,
         String author) {
        this.numPages = numPages;
        this.price = price;
        this.name = name;
        this.author = author;
    }
    void get_data()
    {
        System.out.println("Book details\n name:" + name + "\n"
                           + "author : " + author + "\n"
                           + "number of pages : " + numPages + "\n"
                           + "price : " + price);
        System.out.println("\n-----\n");
    }
    public String to_string() {
        return ("Book details\n name : " + name + "\n"
               + "author : " + author + "\n"
               + "number of pages : " + numPages + "\n"
               + "price : " + price + "\n");
    }
}
class lab_3 {
    public static void main (String [] args) {
        Book b1 = new Book();
        Scanner s= new Scanner (System.in);
        System.out.println ("enter the name of the book:");
        String name = s.nextLine();
        System.out.println ("enter the author's name:");
        String name = s.nextLine();
        System.out.println ("enter the number of pages:");
        int numPages = s.nextInt();
        System.out.println ("enter the price:");
        double price = s.nextDouble();
        System.out.println ();
    }
}

```

```

b1.set_data (num_pages, price, name, author);
Book b2 = new book (80, 87.65, "deception point",
                    "dan brown");

b1.get_data();
b2.get_data(); // prints all details
System.out.println(b1);
System.out.println(b2);
s.close();
}
}

public class book {
    int num_pages;
    double price;
    String name;
    String author;
}

```

Program - 3 - Output

enter the name of book: harry potter

enter the author's name: JK Rowling

enter the number of pages: 500

enter the price: 450

Book details

name: harry potter

author: JK Rowling

number of pages: 500

price: 450

Book details

name: deception point

author: dan brown

number of pages: 20

price: 87.65

Output:

```

total credits:7
SGPA:2.142857142857143
C:\Users\bmce\Desktop\10921CS065>javac book.java
C:\Users\bmce\Desktop\10921CS065>java lab_2
enter the name of the book: harry potter
enter the author's name: JK Rowling
enter the number of pages in the book: 500
enter the price of the book: 450
book details
name: harry potter
author: JK Rowling
number of pages: 500
price: 450.0
-----
book details
name: deception point
author: dan brown
number of pages: 20
price: 87.65
-----
book details
name: harry potter
author: JK Rowling
number of pages: 500
price: 450.0
-----
book details
name: deception point
author: dan brown
number of pages: 20
price: 87.65
-----
```

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.Scanner;
abstract class shape
{
    shape(){}
    int h,b;
    abstract void printArea();
}
class rectangle extends shape
{
    Scanner s=new Scanner(System.in);
    void printArea()
    {
        System.out.println("Enter height and width of rectangle");
        h=s.nextInt();
        b=s.nextInt();
        System.out.println("Area of Rectangle is "+b*h);
    }
    rectangle(){}
}

class triangle extends shape
{
    Scanner s=new Scanner(System.in);
    void printArea()
    {
        System.out.println("Enter height and base of triangle");
        h=s.nextInt();
        b=s.nextInt();
    }
}
```

```

        System.out.println("Area of Triangle is "+0.5*b*h);
    }
    triangle(){}
}

class circle extends shape
{
    Scanner s=new Scanner(System.in);
    void printArea()
    {
        System.out.println("Enter radius of Circle");
        h=s.nextInt();
        System.out.println("Area of Circle is "+3.14*h*h);
    }
    circle(){}
}

class main
{
    public static void main(String xx[])
    {
        rectangle r=new rectangle();
        r.printArea();
        triangle t=new triangle();
        t.printArea();
        circle c=new circle();
        c.printArea();
    }
}

```

OBSERVATION:

PROGRAM-4

```

import java.util.Scanner;
abstract class shape {
    abstract void printArea();
}
class rectangle extends shape {
    Scanner s = new Scanner(System.in);
    void printArea() {
        System.out.println("Enter height & width of rectangle");
        int h, b;
        h = s.nextInt();
        b = s.nextInt();
        System.out.println("Area of rectangle is " + b * h);
    }
}
class triangle extends shape {
    Scanner s = new Scanner(System.in);
    void printArea() {
        System.out.println("Enter height & base of triangle");
        int h, b;
        h = s.nextInt();
        b = s.nextInt();
        System.out.println("Area of triangle is " + 0.5 * b * h);
    }
}
class circle extends shape {
    Scanner s = new Scanner(System.in);
    void printArea() {
        System.out.println("Enter the radius of circle");
        int r;
        r = s.nextInt();
        System.out.println("Area of circle is " + 3.14 * r * r);
    }
}
class main {
    public static void main (String []xx) {
        Rectangle r = new rectangle();
        r.printArea();
        Triangle t = new triangle();
        t.printArea();
        Circle c = new circle();
        c.printArea();
    }
}

```

Output:-

```

Enter height and width of rectangle
80
30
Area of Rectangle is 600

Enter height and base of triangle
80
80
Area of Triangle is 800

Enter radius of circle
20
Area of circle is 1256

```

OUTPUT:

```
Microsoft Windows [Version 10.0.19044.1706]
(c) Microsoft Corporation. All rights reserved.

C:\Users\bmsce>cd C:\Users\bmsce\Desktop\IBM21CS065
C:\Users\bmsce\Desktop\IBM21CS065>set path="C:\Program Files\Java\jdk1.8.0_201\bin"
C:\Users\bmsce\Desktop\IBM21CS065>java main
Enter height and width of rectangle
20
10
Area of Rectangle is 600
Enter height and base of triangle
20
10
Area of Triangle is 300.0
Enter radius of circle
20
Area of Circle is 1256.0
C:\Users\bmsce\Desktop\IBM21CS065>
```

PROGRAM 5

Develop a Java program to create a class Bank that maintains two kinds of account for its customers, one called a savings account and the other a 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.Scanner;
import java.lang.Math;

class account
{
    String name=new String();
    int accno;
    double bal;
    Scanner s=new Scanner(System.in);
    void set()
    {
        System.out.println("Enter customer name");
        name=s.nextLine();
        System.out.println("Enter "+name+"'s account number");
        accno=s.nextInt();
        System.out.println("Enter balance amount ");
        bal=s.nextDouble();
    }
    void display()
    {
        System.out.println("Customer Name:"+name);
        System.out.println("Your account number:"+accno);
```

```

        System.out.println("Your Account Balance:"+bal);
    }
    account(){}
}

class savacct extends account
{
    Scanner s=new Scanner(System.in);
    savacct()
    {
        System.out.println("Cheque Facility not available ");
    }
    void deposit()
    {
        int ch;
        double amt;
        System.out.println("Press 1 to deposit ");
        ch=s.nextInt();
        if(ch==1)
        {
            System.out.println("Enter amount to be deposited ");
            amt=s.nextDouble();
            bal=bal+amt;
        }
        else
            System.out.println("Invalid Input");
    }
    void in()
    {
        System.out.println("Enter rate of interest ");
        double r=s.nextDouble();
        System.out.println("Enter number of times interest applied per time period");
        int n=s.nextInt();
        System.out.println("Enter number of time periods");
        int t=s.nextInt();
        double x=(1+(r/n));
        double ci=bal*Math.pow(x,n*t);
        System.out.println("Interest amount="+ci+" \nBalance amount without interest is"+bal);
        bal=bal+ci;
        System.out.println("Available balance after updating is"+bal);
    }
    void wd()
    {
        System.out.println("Press 1 to withdraw ammount");
        int ch=s.nextInt();
        if(ch==1)
        {

```

```

        System.out.println("Enter the amount to be withdrawn ");
        double wdraw=s.nextDouble();
        bal=bal-wdraw;
        System.out.println("Available Balance:"+bal);}
        else System.out.println("Invalid input");
    }
}

class curacct extends account
{
    Scanner s=new Scanner(System.in);
    curacct()
    {
        System.out.println("Cheque Facility available ");
    }
    void deposit()
    {
        int ch;
        double amt;
        System.out.println("Press 1 to deposit ");
        ch=s.nextInt();
        if(ch==1)
        {
            System.out.println("Enter amount to be deposited ");
            amt=s.nextDouble();
            bal=bal+amt;
        }
        else
            System.out.println("Invalid Input");
    }
    void wd()
    {
        System.out.println("Press 1 to withdraw ammount");
        int ch=s.nextInt();
        if(ch==1)
        {
            System.out.println("Enter the amount to be withdrawn ");
            double wdraw=s.nextDouble();
            bal=bal-wdraw;
            System.out.println("Available Balance:"+bal);}
            else System.out.println("Invalid input");
            if(bal<1000)
            {
                System.out.println("You are running out of minimum balance \n Penalty Amount
of rs 50 has been credited as service charge for having low balance");
                bal=bal-50;
                System.out.println("Your Available Balance:"+bal);
            }
        }
}

```

```

        }
    }

}

public class Lab5
{
    public static void main(String xx[])
    {
        Scanner s=new Scanner(System.in);
        int ch;
        System.out.println("\n\nPress\n1. if your account is savings account \n2. if your account is current account");
        ch=s.nextInt();
        switch(ch)
        {
            case 1:
                savacct s1=new savacct();
                s1.set();
                s1.display();
                s1.deposit();
                s1.in();
                s1.wd();
                break;
            case 2:
                curacct c1=new curacct();
                c1.set();
                c1.display();
                c1.deposit();
                c1.wd();
                break;
            default : System.exit(0);
        }
    }
}

```

OBSERVATION:

PROGRAM-5

9/10/22

Develop a Java program to create a class Bank that maintains two kinds of accounts called Savings account & other current account.

```
import java.util.Scanner; import java.lang.Math;
import java.lang.Math.*;
class account
{
    String name = new String();
    int accno;
    double bal;
    Scanner s = new Scanner(System.in);
    void set()
    {
        System.out.println("Enter customer name:");
        name = s.nextLine();
        System.out.println("Enter "+name+"'s account no.");
        accno = s.nextInt();
        System.out.println("Enter balance amount");
        bal = s.nextDouble();
    }
    void display()
    {
        System.out.println("customer name:" + name);
        System.out.println("your account number :" + accno);
        System.out.println("your account balance :" + bal);
    }
    account(){}
}
```

```
double x = bal * (1 + (r/n));
double cf = bal * Math.pow(x, n*t);
System.out.println("Interest amount=" + cf + "\n Balance amount without interest is " + bal);
bal = bal + cf;
System.out.println("Available balance after updating is "+bal);
}
```

```
void wd()
{
    System.out.println("Press 1 to withdraw amount");
    int ch = s.nextInt();
    if (ch == 1)
    {
        System.out.println("Enter the amount to be withdrawn");
        double withdraw = s.nextDouble();
        bal = bal - withdraw;
        System.out.println("Available balance :" + bal);
    }
    else
        System.out.println("invalid input");
}
```

```
class Current extends account
{
    Scanner s = new Scanner (System.in);
    Current()
    {
        System.out.println("cheque facility available");
    }
}
```

```
class Savacct extends account
{
    Scanner s = new Scanner (System.in);
    Savacct()
    {
        System.out.println("cheque facility not available");
    }
    void deposit()
    {
        int ch;
        double amt;
        System.out.println("Press 1 to deposit");
        ch = s.nextInt();
        if (ch == 1)
            System.out.println("Enter amount to be deposited");
        amt = s.nextDouble();
        bal = bal + amt;
        else
            System.out.println("invalid input");
    }
    void in()
    {
        System.out.println("Enter rate of interest");
        double r = s.nextDouble();
        System.out.println("Enter number of times interest applied for time period");
        int n = s.nextInt();
        System.out.println("Enter number of time periods");
        int t = s.nextInt();
    }
}
```

```
void deposit()
{
    int ch;
    double amt;
    System.out.println("Press 1 to deposit");
    ch = s.nextInt();
    if (ch == 1)
        System.out.println("Enter amount to be deposited");
    amt = s.nextDouble();
    bal = bal + amt;
    else
        System.out.println("invalid input");
}
void wd()
{
    System.out.println("Press 1 to withdraw the amount");
    int ch = s.nextInt();
    if (ch == 1)
        System.out.println("Enter amount to be withdrawn");
    double withdraw = s.nextDouble();
    bal = bal - withdraw;
    System.out.println("Available balance :" + bal);
}
else
    System.out.println("invalid input");
}
```

```

if (bal < 1000)
{
    System.out.println ("You are running out of minimum
                        balance. An amount of rs 50 has
                        been deducted as service charge for having
                        low balance");

    bal = bal - 50;
    System.out.println ("Your available balance is " + bal);
}

public class lab5
{
    public static void main (String args[])
    {
        Scanner s = new Scanner (System.in);
        int ch;

        System.out.println ("In In Press 1 if your account
                            is savings account or
                            2 if your account is current
                            account");
        ch = s.nextInt();
        switch (ch)
        {
            case 1:
                Savacut s1 = new Savacut();
                s1.set();
                s1.display();
        }
    }
}

```

Customer Name : gamana
Your Account Number : 123456
Your Account Balance : 10000
Press 1 to deposit
1
Enter Amount to be deposited
1000
Enter rate of interest
2
Enter number of times interest applied per time period
3
Enter number of time periods
4
Interest amount = 17600
Balance amount without interest is 11000
Available balance after updating is 127600
Press 1 to withdraw amount
1
Enter the amount to be withdrawn
1000
Available Balance : 117600
Press
1. If your account is savings account
2. If your account is current account
3
cheque Facility

```

s1.deposit();
s1.in();
s1.wdc();
break;

case 2:
    curacc = 1 - new curacc();
    c1.setdata();
    c1.display();
    c1.deposit();
    break;

default : system.exit(0);
}

output-
Press
1. If your account is savings account
2. If your account is current account
3. If your account is cheque account
1
Cheque Facility not available
Enter customer name
Gamana
Enter gamana's account number
123456
Enter balance amount
10000

```

Enter customer name
Gamana
Enter gamana's account number
123456
Enter balance amount
10000
Customer name : Gamana
Your Account number : 123456
Your Account Balance : 10000
Press 1 to deposit
1
Enter amount to be deposited
1000
Press 1 to withdraw amount
1
Enter the amount to be withdrawn
1000
Available Balance : 10000

SSB
Gizbert

OUTPUT:

```
Microsoft Windows [Version 10.0.19044.1706]
(c) Microsoft Corporation. All rights reserved.

C:\Users\bmsce>cd C:\Users\bmsce\Desktop\IBM21CS065
C:\Users\bmsce\Desktop\IBM21CS065>set path=%C:\Program Files\Java\jdk1.8.0_281\bin%
C:\Users\bmsce\Desktop\IBM21CS065>javac Lab5.java
C:\Users\bmsce\Desktop\IBM21CS065>java Lab5

Press
1. If your account is savings account
2. If your account is current account
3. Cheque Facility not available
Enter customer name
gamana
Enter gamana's account number
123456
Enter balance amount
10000
Customer Name:gamana
Your account number:123456
Your Account Balance:10000.0
Press 1 to deposit
1
Enter amount to be deposited
1000
Enter rate of interest
2
Enter number of times interest applied per time period
2
Enter number of time periods
2
Interest amount=176000.0
balance amount without interest is110000.0
Available balance after updating is107600.0
Press 1 to withdraw amount
1
Enter the amount to be withdrawn
1000
Available Balance:106000.0
C:\Users\bmsce\Desktop\IBM21CS065>java Lab5

Press
1. If your account is savings account
2. If your account is current account
3. Cheque Facility available
Enter customer name
gamana
Enter gamana 's account number
123456
Enter balance amount
10000
Customer Name:gamana
Your account number:123456
Your Account Balance:10000.0
press 1 to deposit
1
Enter amount to be deposited
1000
press 1 to withdraw amount
1
Enter the amount to be withdrawn
1000
Available Balance:10000.0
C:\Users\bmsce\Desktop\IBM21CS065>java Lab5

Press
1. If your account is savings account
2. If your account is current account
3. Cheque Facility available
Enter customer name
gamana
Enter gamana's account number
123456
Enter balance amount
1000
Customer Name:gamana
Your account number:123456
Your Account Balance:1000.0
press 1 to deposit
1
Enter amount to be deposited
10
press 1 to withdraw amount
1
Enter the amount to be withdrawn
1000
Available Balance:-9890.0
You are running out of minimum balance
Penalty Amount of rs 50 has been credited as service charge for having low balance
Your Available Balance:-9940.0
C:\Users\bmsce\Desktop\IBM21CS065>
```

PROGRAM 6

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.

```
import java.util.Scanner;
class WrongAgeException extends Exception{
    public String toString(){
        return ("age can't be negative");
    }
}

class AgeException extends Exception{
    public String toString(){
        return("Age of son can't be greater than father's age");
    }
}

class Father
{
    int father_age;
    Father(int x) throws WrongAgeException
    {
        father_age=x;
        if(father_age<0)
        {
            throw new WrongAgeException();
        }
    }
}
```

```
class Son extends Father{
    int son_age;
    Son(int x,int y) throws AgeException, WrongAgeException{
        super(x);
        son_age=y;
        if(son_age<0){
            throw new WrongAgeException();
        }
        if(son_age>=father_age){
            throw new AgeException();
        }
    }
}
```

```
class lab7
{
    public static void main(String args[])
    {
        try {
            Scanner s=new Scanner(System.in);
            System.out.println("Enter father's age :");
            int x=s.nextInt();
            System.out.println("Enter son's age:");
            int y=s.nextInt();
            Son S=new Son(x,y);
            System.out.println("Father age is " + S.father_age +
"\nSon age is " + S.son_age);
        }
        catch (WrongAgeException wa) {
            System.out.println(wa);
        }
        catch (AgeException a){
            System.out.println(a);
        }
    }
}
```

```

        catch (Exception e){
            System.out.println("enter valid numbers");
        }
    }
}

```

observation:

<p><u>PROGRAM-6</u></p> <p><u>Exceptions</u></p> <pre> import java.util.Scanner; class WrongAgeException extends Exception { public String toString() { return ("age can't be negative"); } } class AgeException extends Exception { public String toString() { return ("age of son can't be greater than father's age"); } } class Father { int father_age; Father(int x) throws WrongAgeException { } } </pre>	<p>30/10/2023</p> <pre> father_age = x; if (father_age < 0) { throw new WrongAgeException(); } class Son extends Father { int son_age; Son(int x,int y) throws AgeException , WrongAgeException { Super(x); son.age = y; if (son.age < 0) { throw new WrongAgeException(); } if (son.age >= father.age) { throw new AgeException(); } } } class Lab7 { public static void main (String args[]) { } } </pre>
--	--

```

try {
    Scanner s = new Scanner (System.in);
    System.out.println ("Enter father's age :");
    int x = s.nextInt();
    System.out.println ("Enter son's age :");
    int y = s.nextInt();
    Son s0 = new Son (x,y);
    System.out.println ("Father age is " + s0.father.age +
        "\n Son age is " + s0.son.age);
}
}

Catch (WrongException wa)
{
    System.out.println (wa);
}

Catch (AgeException a)
{
    System.out.println (a);
}

Catch (Exception e)
{
    System.out.println ("enter valid numbers");
}

```

output:

```

Enter Father's age : 50
Enter Son's age : 20
Father age is 50
Son age is 20

Enter Father's age : 50
Enter Son's age : 70
Age of son can't be greater than father's age

Enter Father's age : 50
Enter Son's age : -20
age can't be negative

Enter Father's age : 4
enter valid numbers
ND
Sol 1/1/2022

```

Output:

```

C:\Users\lmsce\Desktop\IBM21CS065>java lab7.java
C:\Users\lmsce\Desktop\IBM21CS065>java lab7
Enter father's age :
50
Enter son's age :
20
Father age is 50
Son age is 20

C:\Users\lmsce\Desktop\IBM21CS065>java lab7
Enter father's age :
50
Enter son's age :
70
Age of son can't be greater than father's age

C:\Users\lmsce\Desktop\IBM21CS065>java lab7
Enter father's age :
50
Enter son's age :
-20
age can't be negative

C:\Users\lmsce\Desktop\IBM21CS065>java lab7
Enter father's age :
4
enter valid numbers

C:\Users\lmsce\Desktop\IBM21CS065>

```

Program 7

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.

```
class Call implements Runnable
{
    String a;
    int x,time;
    Thread t;
    Call(String t1,int ti,int x1)
    {
        a=t1;
        x=x1;
        time=ti;
        t=new Thread(this,a);
        t.start();
    }
    public void run()
    {
        try{
            for(int i=0;i<x      ;i++)
            {
                System.out.println(a);
                Thread.sleep(time);
            }
        }
        catch(InterruptedException ie)
        {
            System.out.println("Interrupted execution ");
        }
    }
}
```

```

        }
    }
}

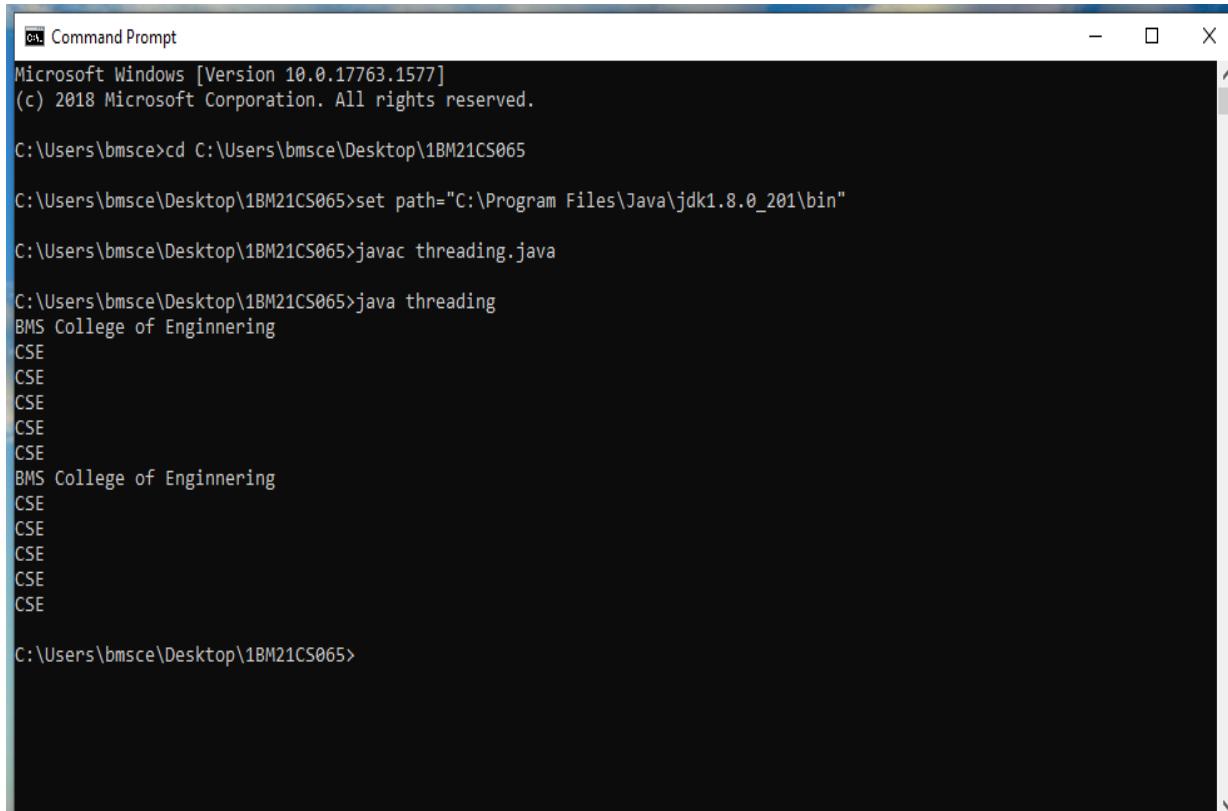
class lab_8
{
public static void main(String xx[])
{
    new Call("BMS College of Engineering",10000,3);
    new Call("CSE",2000,10);
}

```

Observation:

<p><u>PROGRAM - 7</u></p> <p><u>Threads</u></p> <pre> class call implements Runnable { String a; int x, time; Thread t; call (String tn, int ti, int ex) { a = tn; x = ex; time = ti; t = new Thread (this,a); t.start(); } public void run() { try { for (int i=0 ; i<x ; i++) { System.out.println (a); Thread.sleep (time); } } } } </pre>	<p>Catch (InterruptedException ie)</p> <pre> System.out.println("interrupted execution"); } </pre> <p>class Lab-8</p> <pre> public static void main (String xx[]) { new call ("BMS college of Engineering",10000,2); new call ("CSE",2000,10); } </pre> <p>OUTPUT -</p> <p>BMS college of engineering CSE CSE CSE CSE CSE</p> <p>BMS college of engineering CSE CSE CSE CSE CSE</p> <p>N 6/1/2027</p>
--	--

output:



A screenshot of a Microsoft Windows Command Prompt window titled "Command Prompt". The window shows the following text output:

```
Microsoft Windows [Version 10.0.17763.1577]
(c) 2018 Microsoft Corporation. All rights reserved.

C:\Users\bmsce>cd C:\Users\bmsce\Desktop\1BM21CS065
C:\Users\bmsce\Desktop\1BM21CS065>set path="C:\Program Files\Java\jdk1.8.0_201\bin"
C:\Users\bmsce\Desktop\1BM21CS065>javac threading.java

C:\Users\bmsce\Desktop\1BM21CS065>java threading
BMS College of Enginnering
CSE
CSE
CSE
CSE
CSE
BMS College of Enginnering
CSE
CSE
CSE
CSE
CSE
CSE

C:\Users\bmsce\Desktop\1BM21CS065>
```

PROGRAM 8

Create a package CIE which has two classes- Student and Internals- a subclass of Student. The class Student 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 Internals. 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.

```
package CIE;
import java.util.*;
public class student{
    Scanner sc=new Scanner(System.in);
    public String usn,name;
    public int sem;

    public void accept(){
        System.out.println("Enter USN, Name and Current semester: ");
        usn=sc.nextLine();
        name=sc.nextLine();
        sem=sc.nextInt();
    }
    public void display(){
        System.out.println("\nStudent Details");
        System.out.println("Name: "+name);
        System.out.println("USN: "+usn);
        System.out.println("Semester: "+sem);
    }
}

package CIE;
import java.util.*;
```

```
public class internals extends CIE.student {
    Scanner sc=new Scanner(System.in);
    public int ciem[]={new int[5];

    public void accept(){
        int i;
        for(i=0;i<5;i++)
        { System.out.println("Enter CIE marks of subject "+(i+1));
          ciem[i]=sc.nextInt();
        }
    }
}

package SEE;
import CIE.*;
import java.util.*;
public class externals extends CIE.student{
    Scanner sc=new Scanner(System.in);
    public int seem[]={new int[5];

    public void accept(){
        for(int i=0;i<5;i++)
        {
            System.out.println("Enter SEE marks of subject "+(i+1));
            seem[i]=sc.nextInt();
        }
    }
}

import CIE.*;
import SEE.*;
import java.util.*;
class total{
    public static void main(String args[]){
        int i,j,n;
```

```

Scanner sc=new Scanner(System.in);
int total[] = new int[5];
System.out.println("Enter number of students: ");
n=sc.nextInt();
CIE.student s[] = new CIE.student[n];
CIE.internals ci[] = new CIE.internals[n];
SEE.externals se[] = new SEE.externals[n];
for(i=0;i<n;i++)
{
    System.out.println("\nEnter student "+(i+1)+" details");
    s[i]=new CIE.student();
    s[i].accept();
    ci[i]=new CIE.internals();
    ci[i].accept();
    se[i]=new SEE.externals();
    se[i].accept();
}
for(i=0;i<n;i++)
{
    System.out.println("\nDetails of student "+(i+1));
    s[i].display();
    for(j=0;j<5;j++)
    {
        total[j]=ci[i].ciem[j]+se[i].seem[j];
        System.out.println("Total marks in subject "+(j+1)+": "+total[j]);
    }
    System.out.println();
}
}
}

```

OBSERVATION:

PROGRAM - 8

Packages

```
Package CIE;
import java.util.*;
```

```
public class Student
```

```
{
```

```
Scanner sc = new Scanner (System.in);
```

```
public String usn, name;
```

```
public int sem;
```

```
((CIE) <--> S) student <--> CIE
```

```
public void accept()
```

```
{
```

```
System.out.println ("Enter USN, Name and semester :");
```

```
usn = sc.nextLine();
```

```
name = sc.nextLine();
```

```
sem = sc.nextInt();
```

```
}
```

```
public void display()
```

```
{
```

```
System.out.println ("Student Details");
```

```
System.out.println ("Name : " + name);
```

```
System.out.println ("USN : " + usn);
```

```
System.out.println ("Semester : " + sem);
```

```
}
```

```
Package CIE;
```

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

```
public class Internals extends CIE.Student
```

```
{
```

```
Scanner sc = new Scanner (System.in);
```

```
public int clem [] = new int [5];
```

```
public void accept()
```

```
{
```

```
int i;
```

```
for (i=0; i<5; i++)
```

```
{
```

```
System.out.println ("Enter CIE marks of subject " + (i+1));
```

```
clem [i] = sc.nextInt();
```

```
{
```

```
Package SEE;
```

```
import CIE.*;
```

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

```
public class Externals extends CIE.Student
```

```
{
```

```
Scanner sc = new Scanner (System.in);
```

```
public int seem [] = new int [5];
```

```
public void accept()
```

```
{
```

```
for (int i=0; i<5; i++)
```

```
{
```

```
System.out.println ("Enter SEE marks " + (i+1));
```

```
sem [i] = sc.nextInt();
```

```
}
```

```
import CIE.*; student <--> CIE
```

```
import SEE.*;
```

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

```
class total
```

```
{
```

```
public static void main (String args [])
```

```
{
```

```
int i,j,n;
```

```
Scanner sc = new Scanner (System.in);
```

```
int total [] = new int [5];
```

```
System.out.println ("Enter number of students :");
```

```
n = sc.nextInt();
```

```
CIE.Student s [] = new CIE.Student [n];
```

```
CIE.Internals ci [] = new CIE.Internals [n];
```

```
SEE.Externals se [] = new SEE.Externals [n];
```

```
for (i=0; i<n; i++)
```

```
{
```

```
System.out.println ("Enter student " + (i+1) + " details");
```

```
s [i] = new CIE.Student ();
```

```
ci [i] = new CIE.Internals ();
```

```
se [i] = new SEE.Externals ();
```

```
s [i].accept();
```

```
ci [i].accept();
```

```
se [i].accept();
```

```
Se [i].accept(); student <--> CIE
```

```
for (i=0; i<n; i++)
```

```
{
```

```
System.out.println ("Details of student " + (i+1));
```

```
s [i].display();
```

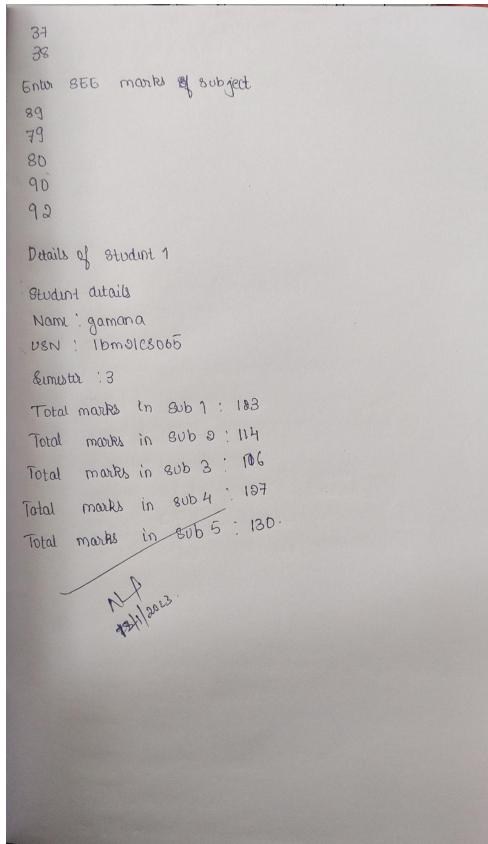
```
for (j=0; j<5; j++)
```

```
{
```

```
total [j] = ci [i].clem [j] + se [i].sem [j];
```

```
System.out.println ("Total marks in subject " + (j+1) + " is " + total [j]);
```

```
System.out.println ("");
```



OUTPUT:

```
Microsoft Windows [Version 10.0.19044.1700]
(c) Microsoft Corporation. All rights reserved.

C:\Users\bmsece>cd C:\Users\bmsece\Desktop\IBM21CS065>set path="C:\Program Files\Java\jdk1.8.0_201\bin"
C:\Users\bmsece\Desktop\IBM21CS065>javac student.java
C:\Users\bmsece\Desktop\IBM21CS065>javac internals.java
C:\Users\bmsece\Desktop\IBM21CS065>javac externals.java
C:\Users\bmsece\Desktop\IBM21CS065>javac packages.java
C:\Users\bmsece\Desktop\IBM21CS065>java total
Enter number of students:
1

Enter student 1 details
Enter USN, Name and Current semester:
ibm21cs065
gamana
3
Enter CIE marks of subject 1
34
Enter CIE marks of subject 2
45
Enter CIE marks of subject 3
36
Enter CIE marks of subject 4
37
Enter CIE marks of subject 5
38
Enter SEE marks of subject 1
89
Enter SEE marks of subject 2
79
Enter SEE marks of subject 3
80
Enter SEE marks of subject 4
90
Enter SEE marks of subject 5
92

Details of student 1

Student Details
Name: gamana
USN: ibm21cs065
Semester: 3
Total marks in subject 1: 103
Total marks in subject 2: 114
Total marks in subject 3: 106
Total marks in subject 4: 107
Total marks in subject 5: 130

C:\Users\bmsece\Desktop\IBM21CS065>
```