

LAB 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 discriminant $b^2 - 4ac$ is negative, display a message stating that there are no real solutions.

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Lab 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 discriminant $b^2 - 4ac$ is negative, display a message stating that there are no real solutions.

```
import java.util.Scanner;
import java.util.*;
import java.math.*;
class Quadratic
{
    public static void main (String xx[])
    {
        Scanner ss = new Scanner (System.in);
        System.out.print ("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 = ((b*b) - (4*a*c));
        if (a!=0)
        {
            if (d>0)
            {
                double d1 = ((-b + Math.pow(d, 0.5))/
                             (2.0*a));
                double d2 = ((-b - Math.pow(d, 0.5))/
                             (2.0*a));
                System.out.println ("The Roots are
real and distinct\n");
            }
        }
    }
}
```

```
System.out.println ("The Roots are :"
+ d1 + " \t " + d2);
}

else if (d == 0.0)
{
    double rr = ((-b + Math.pow (d, 0.5)) /
(2.0 * a)); // real root
    System.out.println ("The Roots are
real and equal");
    System.out.println ("The Root is " + rr);
}

else if (d < 0)
{
    double ir = ((-b / (2.0 * a)));
    double img = (Math.pow (Math.abs (d),
0.5) / (2.0 * a));
    System.out.println ("The Roots are
Imaginary");
    System.out.println ("Roots are :" + ir +
" + i" + img + " and " + ir + " - i" + img);
}

else
{
    System.out.println ("INVALID INPUTS.
TRY AGAIN!");
}

else
{
    System.out.println ("INVALID INPUTS.
TRY AGAIN!");
}
```

Output:

① Enter the value of a : 50

Enter the value of b : 100

Enter the value of c : 50

The Roots are real and equal

The Root is : -1.0

② Enter the value of a : 1

Enter the value of b : 50

Enter the value of c : 50

The Roots are real and distinct

The Roots are : -1.0208423834 and

-48.9791516156

③ Enter the value of a : 1

Enter the value of b : 2

Enter the value of c : 3

The Roots are imaginary

~~All~~ The Roots are $-1 + i1.414213$ and $-1 - i1.414213$

④ Enter the value of a : 0

Enter the value of b : 45

Enter the value of c : 5

INVALID INPUTS. TRY AGAIN

OUTPUT:

```
C:\ Command Prompt
Microsoft Windows [Version 10.0.22000.1219]
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C:\Users\dhiks>cd C:\Users\dhiks\Desktop

C:\Users\dhiks\Desktop>javac Quadratic.java

C:\Users\dhiks\Desktop>java Quadratic
Enter the value of a:50
Enter the value of b:100
Enter the value of c:50
The Roots are real and equal

The Root is:-1.0

C:\Users\dhiks\Desktop>javac Quadratic.java

C:\Users\dhiks\Desktop>java Quadratic
Enter the value of a:1
Enter the value of b:50
Enter the value of c:50
The Roots are real and distinct

The Roots are:-1.0208423834364027      -48.9791576165636

C:\Users\dhiks\Desktop>javac Quadratic.java

C:\Users\dhiks\Desktop>java Quadratic
Enter the value of a:1
Enter the value of b:2
Enter the value of c:3
The Roots are imaginary

Roots are:-1.0+i1.4142135623730951 and-1.0-i1.4142135623730951

C:\Users\dhiks\Desktop>javac Quadratic.java

C:\Users\dhiks\Desktop>java Quadratic
Enter the value of a:0
Enter the value of b:45
Enter the value of c:5
INVALID INPUTS. TRY AGAIN!

C:\Users\dhiks\Desktop>
```

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.

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Lab Program 2

II 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
{
    String name, usn;
    int marks[] = new int[5];
    int credits[] = new int[5];

    void input()
    {
        Scanner ss = new Scanner(System.in);
        System.out.println("Enter your name:");
        name = ss.nextLine();
        System.out.println("Enter your usn:");
        usn = ss.next();
        System.out.println("Enter the marks of each subject:");
        for (int i = 0; i < 5; i++)
        {
            marks[i] = ss.nextInt();
        }
        System.out.println("Enter the number of credits for each subject:");
        for (int i = 0; i < 5; i++)
        {
            credits[i] = ss.nextInt();
        }
    }

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

    float calculateSGPA()
    {
        float totalMarks = 0;
        float totalCredits = 0;
        for (int i = 0; i < 5; i++)
        {
            totalMarks += marks[i];
            totalCredits += credits[i];
        }
        float sgpa = totalMarks / totalCredits;
        return sgpa;
    }
}
```

```
void display()
{
    System.out.println("NAME :" + name);
    System.out.println(" & USN :" + usn);
    for (int i = 0; i < 5; i++)
    {
        System.out.println("Marks of each subject " + (i + 1) + " = " + marks[i]);
        System.out.println("Number of credits for each subject " + (i + 1)
                           + " = " + credits[i]);
    }
}

void calc()
{
    int gr-point[] = new int[5];
    int sgpa = 0;
    int sum = 0; float res;
    for (int i = 0; i < 5; i++)
    {
        if (marks[i] >= 90)
            gr-point[i] = 10;
        else if (marks[i] >= 80)
            gr-point[i] = 9;
        else if (marks[i] >= 70)
            gr-point[i] = 8;
        else if (marks[i] >= 60)
            gr-point[i] = 7;
        else if (marks[i] >= 50)
            gr-point[i] = 6;
        else if (marks[i] >= 40)
            gr-point[i] = 5;
    }
}
```

```
else if (marks[i] >= 35)
    gr-point = 4;
else if (marks[i] < 35 && marks[i] > 0)
    gr-point = 0;
else
    System.out.println (" Invalid
marks for subject " + (i+1) + "
entered. Try Again!");
    sgpa += (gr-point[i] * credits[i]);
    sum += (credits[i]);
}
```

res = (float) sgpa / sum;

System.out.println (" SGPA = " + res);

}

}

class sgpa

{

public static void main (String xx[])
{

Student s1 = new Student();

s1.input();

s1.display();

s1.calc();

}

}

Output:

Enter your name:

Dhiksha Rathis

Enter your usn:

IBM21CS055

Enter the marks of each subject:

98

88

78

67

98

Enter the number of credits for each subject:

4

3

2

1

4

NAME: Dhiksha Rathis

USN: IBM21CS055

Marks of subject 1: 98

Number of credits for subject 1: 4

Marks of subject 2: 88

Number of credits for subject 2: 3

Marks of subject 3: 78

Number of credits for subject 3: 2

Marks of subject 4: 67

Number of credits for subject 4: 1

Marks of subject 5: 98

Number of credits for subject 5: 4

SGPA = 9.285714

OUTPUT:

```
cmd Command Prompt
Microsoft Windows [Version 10.0.22000.1219]
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C:\Users\dhiks>cd C:\Users\dhiks\Desktop

C:\Users\dhiks\Desktop>javac sgpa.java

C:\Users\dhiks\Desktop>java sgpa
Enter your name:
Dhiksha Rathis
Enter your USN:
1BM21CS055
Enter the marks of each subject:
98
88
78
67
98
Enter the number of credits of each subject:
4
3
2
1
4
NAME: Dhiksha Rathis
USN: 1BM21CS055
Marks of subject 1= 98
Number of credits for subject 1= 4
Marks of subject 2= 88
Number of credits for subject 2= 3
Marks of subject 3= 78
Number of credits for subject 3= 2
Marks of subject 4= 67
Number of credits for subject 4= 1
Marks of subject 5= 98
Number of credits for subject 5= 4
SGPA= 9.285714
```

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.

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Lab Program 3

III 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
{
    String name, author;
    double price;
    int num_pages;
    Book()
    {
        name = " ";
        author = " ";
        price = 0.0;
        num_pages = 0;
    }
    void input()
    {
        Scanner ss = new Scanner(System.in);
        System.out.println("Enter the name of the book:");
        name = ss.nextLine();
        System.out.println("Enter the author of the book:");
        author = ss.nextLine();
        System.out.println("Enter the price of the book:");
    }
}
```

```
price = ss.nextDouble();
System.out.println("Enter the number
of pages of the book:");
num-pages = ss.nextInt();
}

public String toString()
{
    return ("NAME: " + name + "\nAUTHOR: "
+ author + "\nPRICE: " + price + "/-"
+ "\nNUMBER OF PAGES: " + num-pages + "\n");
}

class book_main
{
    public static void main (String xx[])
    {
        Scanner s = new Scanner (System.in);
        System.out.println("Enter the
number of books:");
        int n = s.nextInt();
        Book books[] = new Book[n];
        for (int i=0; i < n; i++)
        {
            books[i] = new Book ();
            books[i].input ();
            System.out.println ("\nBOOK
DETAILS:");
            System.out.println (books[i].
toString ());
        }
    }
}
```

```
price = ss.nextDouble();
System.out.println("Enter the number
of pages of the book:");
numPages = ss.nextInt();
}

public String toString()
{
    return ("NAME: " + name + "\nAUTHOR: "
+ author + "\nPRICE: " + price + "/-"
+ "\nNUMBER OF PAGES: " + numPages + "\n");
}

class BookMain
{
    public static void main(String[] args)
    {
        Scanner s = new Scanner(System.in);
        System.out.println("Enter the
number of books:");
        int n = s.nextInt();
        Book books[] = new Book[n];
        for(int i=0; i < n; i++)
        {
            books[i] = new Book();
            books[i].input();
            System.out.println("\nBOOK
DETAILS:");
            System.out.println(books[i].
toString());
        }
    }
}
```

OUTPUT:

Enter the number of books:

2

Enter the name of the book:

Harry Potter and the Goblet of Fire

Enter the author of the book:

JK Rowling

Enter the price of the book:

462.54

Enter the number of pages of the book:

783

BOOK DETAILS:

NAME: Harry Potter and the Goblet of Fire

AUTHOR: JK Rowling

PRICE: 462.54/-

NUMBER OF PAGES: 783

Enter the name of the book:

Merchant of Venice

Enter the author of the book:

Shakespeare

Enter the price of the book:

230.76

Enter the number of pages of the book:

500

BOOK DETAILS

NAME: Merchant of Venice

AUTHOR: Shakespeare

PRICE: 230.76/-

NUMBER OF PAGES: 500

OUTPUT:

```
cmd Command Prompt
Microsoft Windows [Version 10.0.22000.1219]
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C:\Users\dhiks>cd C:\Users\dhiks\Desktop

C:\Users\dhiks\Desktop>javac Lab3_java.java

C:\Users\dhiks\Desktop>java book_main
Enter the number of books:
2
Enter the name of the book:
Harry Potter and the Goblet of Fire
Enter the author of the book:
JK Rowling
Enter the price of the book:
462.54
Enter the number of pages of the book:
783

BOOK DETAILS:
NAME: Harry Potter and the Goblet of Fire
AUTHOR: JK Rowling
PRICE: 462.54/-
NUMBER OF PAGES: 783

Enter the name of the book:
Merchant of Venice
Enter the author of the book:
Shakespeare
Enter the price of the book:
230.76
Enter the number of pages of the book:
500

BOOK DETAILS:
NAME: Merchant of Venice
AUTHOR: Shakespeare
PRICE: 230.76/-
NUMBER OF PAGES: 500
```

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.

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Lab Program 4

IV 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.

```
import java.util.Scanner;
import java.lang.Math.*;
abstract class Shape
{
    int length, breadth;
    Scanner ss = new Scanner(System.in);
    abstract void printArea();
}
class Rectangle extends Shape
{
    void printArea()
    {
        System.out.println("Enter length and breadth : ");
        length = ss.nextInt();
        breadth = ss.nextInt();
        int area = length * breadth;
        System.out.println("The area of rectangle is : " + area);
    }
}
```

```
class Triangle extends Shape
{
    void printArea() {
        System.out.println("Enter base
                           length and height : ");
        length = ss.nextInt();
        breadth = ss.nextInt();
        int area = (length * breadth) / 2;
        System.out.println("The area of
                           Triangle is: " + area);
    }
}
```

```
class Circle extends Shape
{
    void printArea() {
        System.out.println("Enter the
                           radius of circle : ");
        radius = ss.nextInt();
        double area = Math.PI * (radius *
                                  radius);
        System.out.println("The area of
                           circle is : " + area);
    }
}
```

```
class S-main
{
    public static void main(String args[])
    {
        int ch;
        Scanner scan = new Scanner(System.in);
        System.out.println("Enter MENU\n
                           +Rect+ Select Shape\n
                           1. Rectangle\n
                           2. Triangle\n
                           3. Circle");
    }
}
```

```
ch = scan.nextInt();
switch(ch)
{
    case 1: Rectangle r1 = new Rectangle();
              r1.printArea();
              break;
    case 2: Triangle t1 = new Triangle();
              t1.printArea();
              break;
    case 3: Circle c1 = new Circle();
              c1.printArea();
              break;
    default: System.out.println("Invalid input"); Try Again!";
}
```

OUTPUT:

① MENU

Select shape

- 1. Rectangle
- 2. Triangle
- 3. Circle

1

Enter length and breadth

10 20

The area of Rectangle is: 200

② MENU

Select Shape

- 1. Rectangle
- 2. Triangle
- 3. Circle

2

Enter Base length and height:

10 20

The area of Triangle is: 100

③ MENU

Select Shape

1. Read Rectangle
2. Triangle
3. Circle

3

Enter the ^{radius} area of circle

4

The area of circle is: 50.2654824

④ MENU

Select Shape

1. Rectangle
2. Triangle
3. Circle

5

Invalid input, Try Again!

9/12/2022

OUTPUT:

```
Command Prompt - java s_main
Microsoft Windows [Version 10.0.22000.1219]
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C:\Users\dhiks>cd C:\Users\dhiks\Desktop

C:\Users\dhiks\Desktop>javac Lab4_java.java

C:\Users\dhiks\Desktop>java s_main
MENU
Select Shape
1.Rectangle
2.Triangle
3.Circle
1
Enter length and breadth:
10 20
The area of rectangle is:
200
MENU
Select Shape
1.Rectangle
2.Triangle
3.Circle
2
Enter Base length and Height:
10 20
The area of triangle is:
100
MENU
Select Shape
1.Rectangle
2.Triangle
3.Circle
3
Enter radius of circle:
4
The area of circle is:
50.26548245743669
MENU
Select Shape
1.Rectangle
2.Triangle
3.Circle
5
Invalid Input, Try Again!
```

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 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.

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V 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 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 balance

Check for the minimum balance, impose penalty if necessary and update the balance.

```
import java.util.Scanner;
import java.lang.Math;
class Account
{
    String name, acc-type;
    int acc-no;
```

```
double bal, dep;
Scanner ss = new Scanner (System. in );
void setd()
{
    System.out.println ("Enter your name:");
    name = ss.next();
    System.out.println ("Enter your
        account number:");
    acc_no = ss.nextInt();
    System.out.println ("Enter your
        account type: (Savings / Current)");
    acc_type = ss.next();
    System.out.println ("Enter the Bank
        Balance"); bal = ss.nextDouble();
}
```

```
void disp() {
    System.out.println ("Name: " + name);
    System.out.println ("Account
        Number: " + acc_no);
    System.out.println ("Account type:"
        + acc_type);
    System.out.println ("Current
        Balance is: " + bal);
}
```

```
void deposit() {
    System.out.println ("Enter the
        amount to be deposited:");
    dep = ss.nextDouble();
    bal += dep;
    System.out.println ("Balance
        amount: " + bal);
}
```

```
boolean acc (String acc-type)
{
    if (acc-type == "Savings")
        return true;
    else if (acc-type == "Current")
        return false;
    else
        return true;
}

class Cur-account extends Account
{
    int penal()
    {
        double min, pen;
        System.out.println ("\nEnter minimum
balance & penalty amount if not
followed:");
        min = ss.nextDouble(); pen = ss.nextDouble();
        if (bal < min)
        {
            bal -= pen;
            System.out.println ("Penalty
imposed for having insufficient
balance"); }
        else
            return 1;
    }

    void withdrawal()
    {
        double amt;
        System.out.println ("Enter
amount to be withdrawn:");
        amt = ss.nextDouble(); int a = penal();
        if (a == 1)
        {
            if (bal >= amt)
```

```
{ bal -= amt;  
System.out.println("Account  
Balance after withdrawal  
is :" + bal); }
```

{

else

```
System.out.println("In Account Balance  
after withdrawal. The amount  
can't be withdrawn");
```

}

{.

class SavAcct extends Account

{

void calcInterest()

{

```
System.out.println("Enter time and  
rate of interest");
```

double t = sc.nextDouble();

double r = ss.nextDouble();

double CI = bal * Math.pow((1+r)/100, t);

~~System.out.println("Compound
Interest is " + CI);~~

//bal += CI;

~~System.out.println("Balance
amount : " + bal);~~

{

void withdrawal()

{ double amt;

~~System.out.println("Enter amount
to be withdrawn : ");~~

amt = ss.nextDouble();

if (bal >= amt)

{ bal -= amt;

```
System.out.println ("Account  
Balance after withdrawal is :"  
+ bal);  
}  
else  
    System.out.println ("In The  
amount can't be withdrawn");  
}  
}  
  
class Bank  
{  
    public static void main (String args[])  
    {  
        Scanner ss = new Scanner (System.in);  
        Account al = new Account();  
        al.setd();  
        if (al.acc (al.acc-type) == true )  
        {  
            Sav-acct s1 = new Sav-acct();  
            s1.name = al.name; s1.acc-no =  
            al.acc-no; s1.acc-type = al.acc-type;  
            s1.bal = al.bal;  
            System.out.println ("Enter your  
choice. /n 1. Deposit /n 2. calculate  
interest /n 3. withdraw /n 4. Display  
/n 5. Exit "); int ch = ss.nextInt();  
            switch(ch)  
            {  
                case 1: s1.deposit(); break;  
                case 2: s1.calc-interest (); break;  
                case 3: s1.withdrawal(); break;  
                case 4: s1.disp (); break;  
                case 5: exit(0); break;  
            }  
        }  
    }  
}
```

default: System.out.println(
 "Invalid Input");

}

}

else

{

Cur-acct c1 = new Cur-acct();

c1.name = al.name; c1.acc_no = al.acc_no;

c1.acc-type = al.acc-type; c1.bal = al.bal;

System.out.println("Enter your
choice: /n 1. Deposit /n 2. Penalty check /n
3. Withdraw /n 4. Display /n 5. Exit");

int ch = ss.nextInt();

switch(ch)

{

case 1: c1.deposit(); break;

case 2: c1.penalty(); break;

case 3: c1.withdrawal(); break;

case 4: c1.disp(); break;

case 5: st.exit(0); break;

default: System.out.println(

"Invalid input");

}

}

}

OUTPUT

① Enter your Name:

Dhiksha

Enter your Account Number:

123456

Enter your Account type: (Savings / Current)

Savings

Enter the Bank Balance:

30000

Enter your choice:

1. Deposit

2. Calculate interest

3. Withdraw

4. Display

5. Exit

1

Enter the amount to be deposited:

5000

Balance Amount: 35000.0

Enter your choice:

1. Deposit

2. Calculate interest

3. Withdraw

4. Display

5. Exit

3

Enter amount to be withdrawn:

5000

Account Balance after withdrawal is : 30000.0

Enter your choice:

1. Deposit

2. Calculate interest

3. Withdraw

4. Display

5. Exit

2.

Enter Time in years and Rate of interest

2 5.4

Account Balance after compounding interest:

33327.48

Enter your choice

1. Deposit

2. calculate Interest

3. withdraw

4. Display

5. Exit

4

Name : Dhiksha

Account Number : 123456

Account Type : Savings

Current Balance is : \$33327.48

Enter your choice

1. Deposit

2. calculate Interest

3. withdraw

4. Display

5. Exit

5

② Enter your name:

Driksha

Enter your Account Number:

123456

Enter your Account Type (Savings / Current)

Current

Enter the bank Balance:

30000

Enter your choice:

1. Deposit
2. Penalty Check
3. Withdraw
4. Display
5. Exit

1

Enter the amount to be deposited:

3000

Balance amount : 33000.0

Enter your choice

1. Deposit
2. Penalty Check
3. Withdraw
4. Display
5. Exit

2

Enter minimum

No penalty

Enter your choice :

1. Deposit
2. Penalty Check
3. withdraw
4. Display
5. Exit

3

Enter amount to be withdrawn :

5000

No penalty

Account Balance after withdrawal is:

28000. 0

Enter your choice

1. Deposit
2. Penalty Check
3. withdraw
4. Display
5. Exit

4

Name : Dinksha

Account Number : 123456

Account Type : Current

Current balance is : 28000

Enter your choice

1. Deposit
2. Penalty Check
3. withdraw
4. Display
5. Exit

5 E

~~Logout~~

OUTPUT:

```
ct Command Prompt
Microsoft Windows [Version 10.0.22000.1219]
(c) Microsoft Corporation. All rights reserved.

C:\Users\dhiks>cd C:\Users\dhiks\Desktop

C:\Users\dhiks\Desktop>javac Lab5_java.java

C:\Users\dhiks\Desktop>java Bank
Enter your Name:
Dhiksha
Enter your Account Number:
123456
Enter your Account type: (Savings/Current)
Savings
Enter the Bank Balance:
30000
Enter your choice:
1.Deposit
2.Calculate interest
3.Withdraw
4.Display
5.Exit
1
Enter the amount to be deposited:
5000
Balance Amount: 35000.0
Enter your choice:
1.Deposit
2.Calculate interest
3.Withdraw
4.Display
5.Exit
3
Enter amount to be withdrawn:
5000
Account Balance after withdrawal is:30000.0
Enter your choice:
1.Deposit
2.Calculate interest
3.Withdraw
4.Display
5.Exit
2
Enter Time in years and Rate of interest
2 5.4
```

C:\ Command Prompt

```
Enter your choice:  
1.Deposit  
2.Calculate interest  
3.Withdraw  
4.Display  
5.Exit  
2  
Enter Time in years and Rate of interest  
2 5.4  
Account Balance after compounding interest: 33327.48  
Enter your choice:  
1.Deposit  
2.Calculate interest  
3.Withdraw  
4.Display  
5.Exit  
4  
Name: Dhiksha  
Account Number: 123456  
Account Type: Savings  
Current balance is: 33327.48  
Enter your choice:  
1.Deposit  
2.Calculate interest  
3.Withdraw  
4.Display  
5.Exit  
5
```

cmd Command Prompt

```
Microsoft Windows [Version 10.0.22000.1219]
(c) Microsoft Corporation. All rights reserved.

C:\Users\dhiks>cd C:\Users\dhiks\Desktop

C:\Users\dhiks\Desktop>javac Lab5_java.java

C:\Users\dhiks\Desktop>java Bank
Enter your Name:
Dhiksha
Enter your Account Number:
123456
Enter your Account type: (Savings/Current)
Current
Enter the Bank Balance:
30000
Enter your choice:
1.Deposit
2.Penalty Check
3.Withdraw
4.Display
5.Exit
1
Enter the amount to be deposited:
3000
Balance Amount: 33000.0
Enter your choice:
1.Deposit
2.Penalty Check
3.Withdraw
4.Display
5.Exit
2
No penalty
Enter your choice:
1.Deposit
2.Penalty Check
3.Withdraw
4.Display
5.Exit
3
Enter amount to be withdrawn:
5000
No penalty
Account Balance after withdrawal is:28000.0
```

Command Prompt

```
3.Withdraw
4.Display
5.Exit
1
Enter the amount to be deposited:
3000
Balance Amount: 33000.0
Enter your choice:
1.Deposit
2.Penalty Check
3.Withdraw
4.Display
5.Exit
2
No penalty
Enter your choice:
1.Deposit
2.Penalty Check
3.Withdraw
4.Display
5.Exit
3
Enter amount to be withdrawn:
5000
No penalty
Account Balance after withdrawal is:28000.0
Enter your choice:
1.Deposit
2.Penalty Check
3.Withdraw
4.Display
5.Exit
4
Name: Dhiksha
Account Number: 123456
Account Type: Current
Current balance is: 28000.0
Enter your choice:
1.Deposit
2.Penalty Check
3.Withdraw
4.Display
5.Exit
5
```

LAB PROGRAM 6:

Write a program that demonstrates handling of exceptions in inheritance tree. Create a base class called "Father" and a 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.

CODE:

Date 30/12/22
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IT Lab 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 is < 0. In sons class, implement a constructor that cases both father and sons age and throws an exception if sons age is \geq fathers age.

```
import java.util.Scanner;
class WrongAge extends Exception
{
    WrongAge() {}
    String msg = new String();
    WrongAge (String s)
    {
        msg = s;
    }
    public String toString()
    {
        return msg;
    }
}
class ErroneAge extends WrongAge
{
    String msg1 = new String();
    ErroneAge (String ss)
    {
        msg1 = ss;
    }
    public String toString()
    {
        return msg1;
    }
}
```

class Father

{

int age;

Scanner ss = new Scanner (System.in);

Father () throws WrongAge;

{ System.out.println ("Enter the
father's age:");

age = ss.nextInt();

} if (age <= 0)

throw new WrongAge ("Invalid
input. Father's age can't be
lessen than zero");

}

}

class Son extends Father {

int age;

Son () throws ErrorAge;

{ System.out.println ("Enter the
son's age:");

age = ss.nextInt();

}

void ex2() throws ErrorAge

{ if (age <= 0 || age >= super.age)

throw new ErrorAge ("Son's age
cannot be greater than that
of Father");

else

{ System.out.println ("Father age:"
+ super.age + " \n Son age:" +
age);

}

}

}

```
class A-main {  
    public static void main (String xx[])  
    {  
        Son s = new Son();  
        try {  
            s.ex1();  
        } catch (WrongAge e) {  
            System.out.println (e);  
        }  
        try {  
            s.ex2();  
        } catch (ErrorAge ea) {  
            System.out.println (ea);  
        }  
    }  
}
```

OUTPUT:

① Enter the father's age:
5

Enter the Son's age:

10

Son's age cannot be greater than that
of Father

② Enter the father's age:
50

Enter the son's age:

18

Father age: 50

Son age: 18

③ Enter the father's age:

0

Enter the son's age:

18

Invalid input. Father's age cannot be
lesser than zero.

Sons age cannot be greater than that of
Father

~~WA'~~
~~511~~

OUTPUT:

```
C:\ Command Prompt
Microsoft Windows [Version 10.0.22000.1219]
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C:\Users\dhiks>cd C:\Users\dhiks\Desktop

C:\Users\dhiks\Desktop>javac Lab6_java.java

C:\Users\dhiks\Desktop>java A_main
Enter the father's age:
5
Enter the age of son:
10
Son's age cannot be greater than that of Father

C:\Users\dhiks\Desktop>java A_main
Enter the father's age:
50
Enter the age of son:
18
FATHER'S AGE:50
SON'S AGE:18

C:\Users\dhiks\Desktop>java A_main
Enter the father's age:
-2
Enter the age of son:
18
Invalid input. Father's age can not be lesser than 0
Son's age cannot be greater than that of Father
```

LAB 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.

CODE:

Date 6/1/23
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VII Lab 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 ThreadDemo implements Runnable
{
    String a; int time;
    int Threadt1;
    ThreadDemo( String b, int t)
    {
        a = b; time = t;
        t1 = new Thread( this, b);
        t1.start();
    }
    public void run()
    {
        try
        {
            for( int i=0; i<10; i++)
            {
                System.out.println( a);
                Thread.sleep( time);
            }
        }
        catch( InterruptedException ie)
        {
            System.out.println( name +
                " interrupted " );
        }
    }
}
```

class T-Main

{
public static void main (String args[])

{
new ThreadDemo ("BMS College of
Engineering", 10000);

new ThreadDemo ("CSE", 2000);

}

OUTPUT:

BMS + College of Engineering

CSE

CSE

CSE

CSE

CSE

BMS College of Engineering

CSE

CSE

CSE

CSE

CSE

BMS College of Engineering

Q/ 5/1/23

OUTPUT:

C:\ Command Prompt

```
Microsoft Windows [Version 10.0.22000.1219]
(c) Microsoft Corporation. All rights reserved.
```

```
C:\Users\dhiks>cd C:\Users\dhiks\Desktop\java
```

```
C:\Users\dhiks\Desktop\java>javac Lab7_java.java
```

```
C:\Users\dhiks\Desktop\java>java T_main
```

```
CSE
```

```
BMS College of Enginnering
```

```
CSE
```

```
CSE
```

```
CSE
```

```
CSE
```

```
BMS College of Enginnering
```

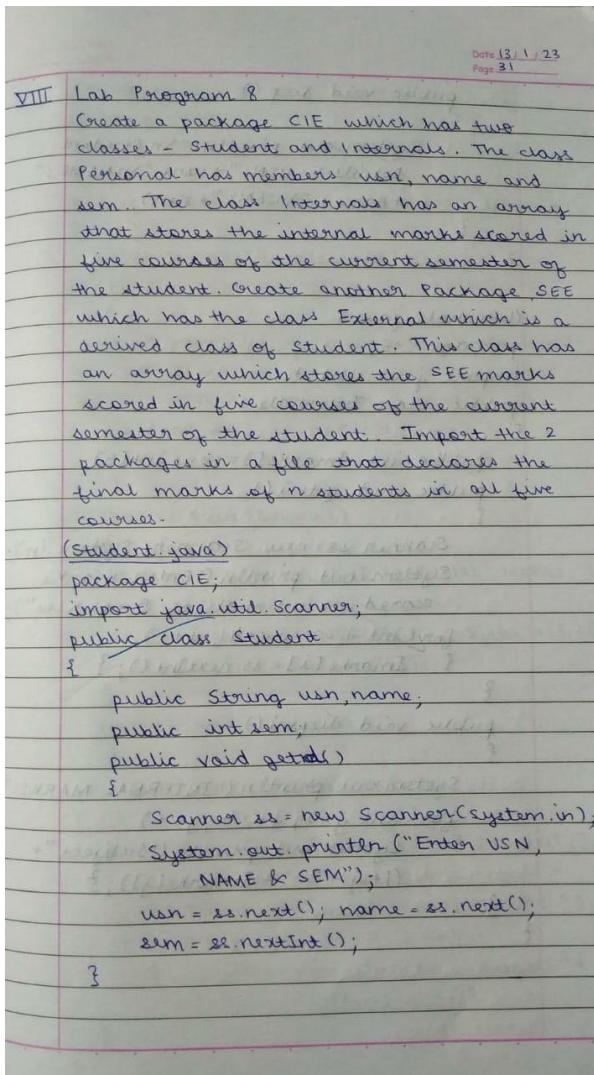
```
CSE
```

```
BMS College of Enginnering
```

LAB PROGRAM 8:

Create a package CIE which has two classes- Student and Internals. 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 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.

CODE:



```
public void disp()
{
    System.out.println("In student
details: In USN: " + usn + " In NAME: "
+ name + " In SEM: " + sem);
}
```

```
(Internals.java)
package CIE;
import java.util.*;
public class Internals
{
    public int Imarks[] = new int[5];
    public void getmi()
    {
```

```
Scanner ss = new Scanner(System.in);
System.out.println("Enter marks
scored in internals of 5 courses");
for(int i=0; i<=4; i++)
{ Imarks[i] = ss.nextInt(); }
```

```
}
```

```
public void dispmi()
{
    System.out.println("INTERNAL MARKS:");
    for(int j=0; j<=4; j++)
    {
        System.out.println("Subject" +
(1+j) + "=" + Imarks[j]); }
}
```

(External.java)

```
package SEE;
import java.util.Scanner;
import CIE.*;
public class External extends CIE.Internal
{
    int Smarks[] = new int[5];
    public void getm()
    {
        Scanner ss = new Scanner(System.in);
        System.out.println("Enter external
                           marks scored in 5 courses :");
        for(int i=0; i<=4; i++)
        {
            Smarks[i] = ss.nextInt();
        }
    }
    public void dispm()
    {
        System.out.println("EXTERNAL MARKS:");
        for(int i=0; i<=4; i++)
        {
            System.out.println(" subject "+(i+1)+"
                               =" + Smarks[i]);
        }
    }
    public void finalcal()
    {
        int Final[] = new int[5];
        for(int j=0; j<=4; j++)
        {
            Final[j] = Imarks[j] + (Smarks[j]/2);
        }
        System.out.println("FINAL MARKS:");
        for(int i=0; i<=4; i++)
        {
            System.out.println(" subject "+
                               (i+1)+ " = " + Final[i]);
        }
    }
}
```

(P-main.java)

```
import CIE.*;  
import SEE.*;  
import java.util.Scanner;  
class P-main  
{  
    public static void main (String arg[])  
    {  
        Scanner ss = new Scanner(System.in);  
        System.out.println ("Enter the  
        number of students:");  
        int n = ss.nextInt();  
        Student s[] = new Student[n];  
        for (int i=0; i<n; i++)  
        {  
            s[i] = new Student();  
            s[i].gett(); s[i].disp();  
            External e = new External();  
            e.getmi(); e.dispmi(); e.getm();  
            e.dispm(); e.finalcal();  
        }  
    }  
}
```

OUTPUT:

Enter the number of students: 2

Enter USN, NAME & SEM

1BM21CS001 Alvin 3

Student Details:

USN: 1BM21CS001

NAME: Alvin

SEM: 3

Enter marks scored in intervals of 5 courses:

49 48 47 46 45

INTERNAL MARKS

Subject 1 = 49

Subject 2 = 48

Subject 3 = 47

Subject 4 = 46

Subject 5 = 45

Enter external marks scored in 5 courses

99 98 97 96 95

EXTERNAL MARKS

Subject 1 = 99

Subject 2 = 98

Subject 3 = 97

Subject 4 = 96

Subject 5 = 95

FINAL MARKS

Subject 1 = 98

Subject 2 = 97

Subject 3 = 95

Subject 4 = 94

Subject 5 = 92

Enter USN, NAME & SEM

IBM21CS002 Theo 3

8'

Student Details :

USN : IBM21CS002

NAME: Theo

SEM: 3

Enter marks scored in intervals of 5 courses:

45 46 47 48 49

INTERNAL MARKS

Subject 1 = 45

Subject 2 = 46

Subject 3 = 47

Subject 4 = 48

Subject 5 = 49

External marks scored in 5 courses:

95 96 97 98 99

EXTERNAL MARKS

Subject 1 = 95

Subject 2 = 96

Subject 3 = 97

Subject 4 = 98

Subject 5 = 99

FINAL MARKS

Subject 1 = 92

Subject 2 = 94

Subject 3 = 95

Subject 4 = 97

Subject 5 = 98

OUTPUT:

```
c:\ Select C:\Windows\System32\cmd.exe
Microsoft Windows [Version 10.0.19045.2364]
(c) Microsoft Corporation. All rights reserved.

C:\Users\bmsce\Desktop\bm21cs055>javac *.java

C:\Users\bmsce\Desktop\bm21cs055>java P_main
Enter the number of students:
2
Enter USN, NAME & SEM
1BM21CS001 Alvin 3

Student Details:
USN:1BM21CS001
NAME:Alvin
SEM:3
Enter marks scored in internals of 5 courses:
49 48 47 46 45
INTERNAL MARKS
Subject0=49
Subject1=48
Subject2=47
Subject3=46
Subject4=45
Enter external marks scored in 5 courses:
99 98 97 96 95
EXTERNAL MARKS
Subject0=99
Subject1=98
Subject2=97
Subject3=96
Subject4=95
FINAL MARKS
Subject1=98
Subject2=97
Subject3=95
Subject4=94
Subject5=92
```

```
Enter USN, NAME & SEM
1BM21CS002 Theo 3

Student Details:
USN:1BM21CS002
NAME:Theo
SEM:3
Enter marks scored in internals of 5 courses:
45 46 47 48 49
INTERNAL MARKS
Subject0=45
Subject1=46
Subject2=47
Subject3=48
Subject4=49
Enter external marks scored in 5 courses:
95 96 97 98 99
EXTERNAL MARKS
Subject0=95
Subject1=96
Subject2=97
Subject3=98
Subject4=99
FINAL MARKS
Subject1=92
Subject2=94
Subject3=95
Subject4=97
Subject5=98
```