

## WEEK 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.

CODE:

```
import java.util.Scanner;
import java.lang.Math;

class solution
{
    public static void main(String args[])
    {
        Scanner s=new Scanner(System.in);
        System.out.println("Enter coefficients");

        float a=s.nextFloat();
        float b=s.nextFloat();
        float c=s.nextFloat();

        if(a!=0){
            double d=b*b-4*a*c;
            if(d==0){
                double r1=(-b)/(2*a);
                System.out.println("Roots are equal and is equal to "+r1);
            }else if(d<0){
                double r1=(Math.sqrt(Math.abs(d)))/(2*a);
                double r2=(-b)/(2*a);
                System.out.println("Imaginary roots.Roots are "+r2+"+"i"+r1+"and "+r2+"-i"+r1);
            }else{
                double r1=(-b+Math.sqrt(d))/(2*a);
                double r2=(-b-Math.sqrt(d))/(2*a);
                System.out.println("Roots are real and distinct. Roots are "+r1+" and "+r2);
            }
        }
        else
        {
            System.out.println("Not a quadratic equation");
        }
    }
}
```

(1) Develop a program to take coefficients from user and display the real roots, display 'imaginary roots' for non-real roots.

```
import java.util.Scanner;  
import java.lang.Math;
```

```
class Solution {
```

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

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

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

```
        float a = s.nextFloat();
```

```
        float b = s.nextFloat();
```

```
        float c = s.nextFloat();
```

```
        if (a!=0) {
```

```
            double d = b*b - 4*a*c;
```

```
            if (d<0) { double r1 = (Math.sqrt (Math.abs (d)))/(2*a);
```

```
                double r2 = (-b)/(2*a); System.out.println ("Imaginary
```

```
                Roots are "+r1+" + i "+ and "+r2+" - i "); } }
```

```
        else {
```

```
            if (d==0) {
```

```
                double r1 = (-b)/(2*a);
```

```
                System.out.println ("Roots are equal  
and is equal to "+r1); } }
```

```
        else {
```

```
            double r1 = (-b+Math.sqrt (d))/(2*a);
```

```
            double r2 = (-b-Math.sqrt (d))/(2*a);
```

```
            System.out.println ("Roots are real and distinct.");
```

```
            Roots are "+r1+ " and "+r2); } }
```

else {

System.out.println("Not a quadratic equation")

}

}

}

Output:

Enter coefficients

1 2 1

Roots are equal and is equal to -1.0

Enter coefficients

0 1 2

Not a quadratic equation

Enter coefficients

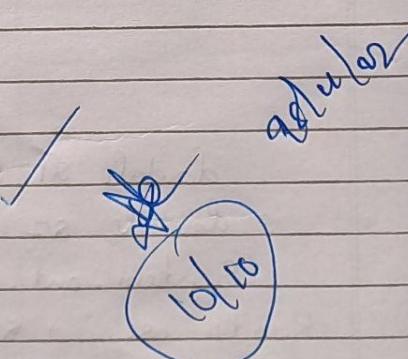
1 2 3

Imaginary roots - Roots are  $-1.0 + i1.414213562373095$  and  
 $-1.0 - i1.414213562373095$

Enter coefficients

2 5 2

Roots are real and distinct. Roots are -0.5 and  
-2.0.



## OUTPUT:

```
Command Prompt
Imaginary roots.Roots are -0.5+i0.8660254037844386
C:\Users\bmscecsse\Desktop\1BM21CS030>javac Quadratic.java
C:\Users\bmscecsse\Desktop\1BM21CS030>java Quadratic.java
Enter coefficients
1 1 1
Imaginary roots.Roots are -0.5+i0.8660254037844386and -0.5-i0.8660254037844386
C:\Users\bmscecsse\Desktop\1BM21CS030>java Quadratic.java
Enter coefficients
1 2 3
Imaginary roots.Roots are -1.0+i1.4142135623730951and -1.0-i1.4142135623730951
C:\Users\bmscecsse\Desktop\1BM21CS030>java Quadratic.java
Enter coefficients
2 5 2
Roots are real and distinct. Roots are -0.5 and -2.0
C:\Users\bmscecsse\Desktop\1BM21CS030>java Quadratic.java
Enter coefficients
0 1 2
Not a quadratic equation
C:\Users\bmscecsse\Desktop\1BM21CS030>java Quadratic.java
Enter coefficients
1 2 1
Roots are equal and is equal to -1.0
C:\Users\bmscecsse\Desktop\1BM21CS030>
```

## WEEK 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;
    float res=0;
    int n;
    int credits[]={};
    int marks[]={};
    int t=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");
        for(int i=0;i<3;i++)
        {
            this.credits[i]=s.nextInt();
            this.marks[i]=s.nextInt();
        }
    }

    void calculate()
    {
        int grade=0;
        for(int i=0;i<3;i++)
        {
            if(marks[i]>=90)
                grade=10;
            else if(marks[i]>=80)
                grade=9;
            else if(marks[i]>=70)
```

```

grade=8;
else if(marks[i]>=60)
grade=7;
else if(marks[i]>=50)
grade=6;
else if(marks[i]>=40)
grade=5;
else grade=0;
res=res+grade*credits[i];
}
for(int i=0;i<3;i++)
t+=credits[i];
res=res/t;
}
void display()
{
System.out.println("Name:"+name+"\nUSN:"+usn);
System.out.println("Marks");
for(int i=0;i<3;i++)
System.out.println(marks[i]);
System.out.println("SGPA="+res);
}
}

```

```

class Lab_2
{
public static void main(String args[])
{
student s1=new student();
s1.accept();
s1.calculate();
s1.display();
}
}

```

```

C:\Users\bmscecse\Desktop\1BM21CS022>java Lab_2
Enter your Name
Aravind
Enter USN
1bm21cs080
Enter credits and marks
3 40 2 40 4 40
Name:Aravind
USN:1bm21cs080
Marks
40
40
40
SGPA=5.0

```

- (2) Develop a Java program to create a class student with members osn, name, an array credits and an array marks. Include methods to accept and display details and a method to calculate sqa of student.

```
import java.util.Scanner;
```

```
class Student {
```

```
    String osn, name;
```

```
    int[] marks = new int[3];
```

```
    int[] credits = new int[3];
```

```
    int[] grade = new int[3];
```

```
    void accept() {
```

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

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

```
        osn = s.next();
```

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

```
        name = s.next();
```

```
        System.out.println("Enter marks in 3 subjects");
```

```
        for (int i = 0; i < 3; i++) {
```

```
            marks[i] = s.nextInt();
```

```
}
```

```
        System.out.println("Enter credits of 3 subjects");
```

```
        for (int i = 0; i < 3; i++) {
```

```
            credits[i] = s.nextInt();
```

```
}
```

```
3
```

```
    void display() {
```

```
        System.out.println("osn: " + osn);
```

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

```
        System.out.println("Marks in 3 subjects");
```

(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 object. Include a testing() method that could display the complete details of the book. Develop a java program to create n book objects.

```
import java.util.Scanner;
```

```
class Books
```

```
String name, author;  
int num-pages;  
float price;  
Book (String n, String a, int num, float p){  
    this .n = name;  
    this .a = author;  
    this .num = num-pages;  
    this .p = price;  
}  
Book () {}
```

```
void set(){
```

```
Scanner s = new Scanner (System.in);  
System.out.println ("Enter book name");  
name = s.nextLine();  
System.out.println ("Enter book author");  
author = s.nextLine();  
System.out.println ("Enter number of pages and price");  
num-pages = s.nextInt();  
price = s.nextFloat();  
}
```

return

Output

Enter your name

Asavind

Enter USN

1bm21cs080

Enter credits and marks

3 40 2 40 4 40

Name : Asavind

USN : 1bm21cs080

Marks

40

40

40

SOPA = ~~50~~ 50 / 100

## WEEK 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{
String name,author;
int num_pages;
float price;

Book(String n,String a,int num,float p){
n=name;
a=author;
num=num_pages;
p=price;
}
Book(){}

void accept(){
Scanner s=new Scanner(System.in);
System.out.println("Enter book name");
name=s.nextLine();
System.out.println("Enter book author");
author=s.nextLine();
System.out.println("Enter number of pages and price of book");
num_pages=s.nextInt();
price=s.nextFloat();
}

void get(){
System.out.println("Title: "+name);
System.out.println("Author: "+author);
System.out.println("Number of pages: "+num_pages);
System.out.println("Price: "+price);
}

public String toString(){
```

```
return ("Title: "+name+"\nAuthor: "+author+"\nNumber of pages: "+num_pages+"\nPrice:  
"+price);  
}  
}
```

```
class Lab_3{  
public static void main(String x[]){  
int n;  
Scanner s=new Scanner(System.in);  
System.out.println("Enter number of books to be created");  
n=s.nextInt();  
Book[] b=new Book[n];  
for(int i=0;i<n;i++){  
b[i]=new Book();  
b[i].accept();  
}  
for(int i=0;i<n;i++){  
System.out.print("\nBook entry number "+(i+1)+"\n\n");  
b[i].get();  
}  
}  
}
```

```
C:\Users\bmscse\Desktop\IBM21CS022>java Lab_3  
Enter number of books to be created  
2  
Enter book name  
java  
Enter book author  
person p  
Enter number of pages and price of book  
100 1000  
Enter book name  
00j  
Enter book author  
person m  
Enter number of pages and price of book  
20 200  
  
Book entry number 1  
Title: java  
Author: person p  
Number of pages: 100  
Price: 1000.0  
  
Book entry number 2  
Title: 00j  
Author: person m  
Number of pages: 20  
Price: 200.0
```

(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 object. Include a testing() 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;  
int num-pages;  
float price;  
Book (String n, String a, int num, float p){  
    this .n = name;  
    this .a = author;  
    this .num = num-pages;  
    this .p = price;  
}  
Book () {}
```

```
void set(){
```

```
Scanner s = new Scanner (System.in);  
System.out.println ("Enter book name");  
name = s.nextLine();  
System.out.println ("Enter book author");  
author = s.nextLine();  
System.out.println ("Enter number of pages and price");  
num-pages = s.nextInt();  
price = s.nextFloat();  
}
```

PAGE NO :  
DATE :

```
void get() {
    System.out.println("name: " + name);
    System.out.println("author: " + author);
    System.out.println("num_pages: " + num_pages);
    System.out.println("price: " + price);
}
```

```
public String toString() {
    return ("name: " + name + "author: " + author +
        "\nnum_pages: " + num_pages + "\nprice: " + price);
}
```

```
class -3 {
    public static void main (String args) {
        int n;
```

```
Scanner s = new Scanner (System.in);
System.out.println ("Enter number of books to be created");
n = s.nextInt();
```

```
Book[] b = new Book[n];
```

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

```
b[i] = new Book();
```

```
b[i].set();
```

```
}
```

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

```
System.out.println (b[i]);
```

```
}
```

```
s.close();
```

```
}
```

```
}
```

Output

Enter number of books to be created  
2

Enter book name

java

Enter book authors

person p

Enter number of pages and price of book

100 1000

Enter book name

obj

Enter book authors

person m

Enter number of pages and price of book

20 2000

Book entry number 1

Title : java

Author : person p

Number of pages : 100

Price : 1000.0

Book entry number 2 ~~20/01/22~~

Title : obj

Author : person m

Number of pages : 20

Price : 200.0

## WEEK 4

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.

```
import java.util.Scanner;

abstract class Shape{
    int b,h;
    void printArea(){}
}

class Rectangle extends Shape{
    Rectangle(int a,int c){
        b=a;
        h=c;
    }
    void printArea(){
        System.out.println("Area of the rectangle is "+(b*h));
    }
}

class Triangle extends Shape{
    Triangle(int a,int c){
        b=a;
        h=c;
    }
    void printArea(){
        System.out.println("Area of the triangle is "+(b*h/2));
    }
}

class Circle extends Shape{
    Circle(int a){
        b=h=a;
    }
    void printArea(){
        System.out.println("Area of the circle is "+(Math.PI*b*h));
    }
}
```

```
        }
    }

class Lab_4{
    public static void main(String[] args) {
        Scanner s=new Scanner(System.in);
        int shape;
        System.out.println("Enter the shape\n1.Rectangle\n2.Triangle\n3.Circle\n4.Exit");
        do {
            shape=s.nextInt();
            if(shape==1){
                System.out.println("Enter breadth and height");
                int a=s.nextInt();
                int c=s.nextInt();
                Rectangle r=new Rectangle(a, c);
                r.printArea();
            }else if(shape==2){
                System.out.println("Enter side length and height");
                int a=s.nextInt();
                int c=s.nextInt();
                Triangle r=new Triangle(a, c);
                r.printArea();
            }else if(shape==3){
                System.out.println("Enter radius");
                int a=s.nextInt();
                Circle r=new Circle(a);
                r.printArea();
            }
        }while (shape!=4);
        s.close();
    }
}
```

```
Enter the shape
1.Rectangle
2.Triangle
3.Circle
4.Exit
1
Enter breadth and height
2 4
Area of the rectangle is 8
2
Enter side length and height
2 4
Area of the triangle is 4
3
Enter radius
1
Area of the circle is 3.141592653589793
4
```

4. Develop an abstract class Shape which has two integers and has a method to printArea. Develop 3 child classes for Rectangle, Triangle, Circle.

```
import java.util.Scanner;
```

```
abstract class Shape{
```

```
    int b, h;
```

```
    void printArea();
```

```
}
```

```
class Rectangle extends Shape{
```

```
    Rectangle (int a, int c){
```

```
        b=a;
```

```
        h=c;
```

```
}
```

```
    void printArea(){
```

```
        System.out.println("Area of the rectangle is "
```

```
        + (b*h));
```

```
}
```

```
}
```

```
class Triangle extends Shape{
```

```
    Triangle (int a, int c){
```

```
        b=a;
```

```
        h=c;
```

```
}
```

```
    void printArea(){
```

```
        System.out.println("Area of the triangle is "
```

```
        + (b * b/h));
```

```
}
```

```
}
```

```

circle class (circle extends Shape) {
    circle (int a) {
        b = h = a;
    }
    void printArea() {
        System.out.println("Area of the circle is " +
            + (Math.PI * b * h));
    }
}

```

```

class Lab_4 {
    public static void main(String args[]) {
        Scanner s = new Scanner(System.in);
        int shape;
        System.out.println("Enter the shape\n
1. Rectangle \n 2. Triangle \n 3. Circle \n 4. Exit");
        do {
            shape = s.nextInt();
            if (shape == 1) {
                System.out.println("Enter breadth and height");
                int a = s.nextInt();
                int c = s.nextInt();
                Rectangle r = new Rectangle(a, c);
                r.printArea();
            } else if (shape == 2) {
                System.out.println("Enter side length and
height");
                int a = s.nextInt();
                int c = s.nextInt();
                Triangle t = new Triangle(a, c);
                t.printArea();
            } else if (shape == 3) {
                System.out.println("Enter radius");

```

```
inf a = s.nextInt();  
Circle c = new Circle(a);  
c.printArea();
```

```
3  
3 while (shape != 4);  
3
```

Output:

Enter the shape

1. Rectangle

2. Triangle

3. Circle

4. Exit

1.

Enter breadth and height

10 5

Area of rectangle is 50

2

Enter side length and height

5 5

Area of triangle is 12.50 ~~50~~ 12.50

3

Enter radius

1

Area of circle 3.14

4

## WEEK 4

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.

```
import java.util.Scanner;
import java.lang.Math;

class Account{

    String name = new String();
    int acc_no;
    double balance;

    void setd(){
        Scanner S = new Scanner(System.in);
        System.out.println("Enter your name : ");
        name = S.nextLine();
        System.out.println("Enter Account number : ");
        acc_no = S.nextInt();
        System.out.println("Enter balance: ");
        balance = S.nextDouble();
```

```

    }
    void display(){
        System.out.println("Name : " + name);
        System.out.println("Account number : " + acc_no);
        System.out.println("Balance : " + balance);
    }
    Account(){}
}

class Savings extends Account{
    Scanner S = new Scanner(System.in);
    Savings(){
        System.out.println("Facilities available are : ");
        System.out.println("1.Withdraawal \n 2.Compound Intrest \n 3.No Cheque");
    }

    void deposit(){
        int choice;
        double dep;
        double wd;
        System.out.println("Enter 1 to deposit : ");
        choice = S.nextInt();
        if(choice == 1){
            System.out.println("Enter the amount to deposit : ");
            dep = S.nextDouble();
            balance += dep;
        }
        else
            System.out.println("Invalid Input");
    }
    void intrest()
    {
        System.out.println("Enter rate of interest : ");
        double r = S.nextDouble();
        r = r/100;
        System.out.println("Enter frequency of interest applied per time period : ");
        int n = S.nextInt();
        System.out.println("Enter time periods : ");
        int t = S.nextInt();
        double x = (1+(r/n));
        double compond_intrest = balance*Math.pow(x,n*t);
        System.out.println("Interest amount="+(compond_intrest-balance)+" \nBalance
amount without interest is"+balance);
        balance = compond_intrest;
    }
}

```

```

        System.out.println("Available balance after updating is : "+balance);
    }
    void withdraw(){
        double wd;
        int choice;
        System.out.println("Enter 1 to withdraw : ");
        choice = S.nextInt();
        if(choice == 1){
            System.out.println("Enter the amount you want : ");
            wd = S.nextDouble();
            if(wd < balance){
                balance = balance - wd;
                System.out.println("Available balance is : " + balance);
            }
            else
                System.out.println("Insufficient balance");
        }
        else
            System.out.println("Invalid Input");
    }
}

class Current extends Account{
    Scanner S = new Scanner(System.in);
    Current()
    {
        System.out.println("Cheque Facility available ");
    }
    void deposit()
    {
        int choice;
        double amount;
        System.out.println("Press 1 to deposit ");
        choice = S.nextInt();
        if(choice==1)
        {
            System.out.println("Enter amount to be deposited ");
            amount=S.nextDouble();
            balance += amount;
        }
        else
            System.out.println("Invalid Input");
    }
}

```

```

void withdraw()
{
    System.out.println("Press 1 to withdraw amount");
    int choice=S.nextInt();
    if(choice==1)
    {
        System.out.println("Enter the amount to be withdrawn ");
        double wd=S.nextDouble();
        balance = balance - wd;
        System.out.println("Available Balance:"+balance);
    }
    else
        System.out.println("Invalid input");

    if(balance<1000)
    {
        System.out.println("You are running out of minimum balance \nAmount
of rs 500 has been debited as service charge for having low balance");
        balance =balance - 500;
        System.out.println("Your Available Balance:"+balance);
    }
}
}

class Lab5
{
    public static void main(String xx[])
    {
        Scanner S = new Scanner(System.in);
        int choice;
        System.out.println("\nPress\n 1. for Savings account \n2.for Current account");
        choice = S.nextInt();
        switch(choice)
        {
            case 1:
                Savings s1=new Savings();
                s1.setd();
                s1.display();
                s1.deposit();
                s1.intrest();
                s1.withdraw();
                break;
            case 2:
        }
    }
}

```

```

        Current c1=new Current();
        c1.setd();
        c1.display();
        c1.deposit();
        c1.withdraw();
        break;
    default : System.exit(0);
}
}

import java.util.Scanner;
import java.lang.Math;

class Account{

    String name = new String();
    int acc_no;
    double balance;

    void setd(){
        Scanner S = new Scanner(System.in);
        System.out.println("Enter your name : ");
        name = S.nextLine();
        System.out.println("Enter Account number : ");
        acc_no = S.nextInt();
        System.out.println("Enter balance: ");
        balance = S.nextDouble();
    }
    void display(){
        System.out.println("Name : " + name);
        System.out.println("Account number : " + acc_no);
        System.out.println("Balance : " + balance);
    }
    Account(){}
}

class Savings extends Account{
    Scanner S = new Scanner(System.in);
    Savings(){
        System.out.println("Facilities available are : ");
        System.out.println("1.Withdraawal \n 2.Compound Intrest \n 3.No Cheque");
    }
}

```

```

void deposit(){
    int choice;
    double dep;
    double wd;
    System.out.println("Enter 1 to deposit : ");
    choice = S.nextInt();
    if(choice == 1){
        System.out.println("Enter the amount to deposit : ");
        dep = S.nextDouble();
        balance += dep;
    }
    else
        System.out.println("Invalid Input");
}
void intrest()
{
    System.out.println("Enter rate of interest : ");
    double r = S.nextDouble();
    r = r/100;
    System.out.println("Enter frequency of interest applied per time period : ");
    int n = S.nextInt();
    System.out.println("Enter time periods : ");
    int t = S.nextInt();
    double x = (1+(r/n));
    double compond_intrest = balance*Math.pow(x,n*t);
    System.out.println("Interest amount="+(compond_intrest-balance)+" \nBalance
amount without interest is"+balance);
    balance = compond_intrest;
    System.out.println("Available balance after updating is : "+balance);
}
void withdraw(){
    double wd;
    int choice;
    System.out.println("Enter 1 to withdraw : ");
    choice = S.nextInt();
    if(choice == 1){
        System.out.println("Enter the amount you want : ");
        wd = S.nextDouble();
        if(wd < balance){
            balance = balance - wd;
            System.out.println("Avilable balance is : " + balance);
        }
        else
    }
}

```

```

        System.out.println("Insufficient balance");
    }
    else
        System.out.println("Invalid Input");
}
}

class Current extends Account{
    Scanner S = new Scanner(System.in);
    Current()
    {
        System.out.println("Cheque Facility available ");

    }
    void deposit()
    {
        int choice;
        double amount;
        System.out.println("Press 1 to deposit ");
        choice = S.nextInt();
        if(choice==1)
        {
            System.out.println("Enter amount to be deposited ");
            amount=S.nextDouble();
            balance += amount;
        }
        else
            System.out.println("Invalid Input");
    }

    void withdraw()
    {
        System.out.println("Press 1 to withdraw amount");
        int choice=S.nextInt();
        if(choice==1)
        {
            System.out.println("Enter the amount to be withdrawn ");
            double wd=S.nextDouble();
            balance = balance - wd;
            System.out.println("Available Balance:"+balance);
        }
        else
            System.out.println("Invalid input");
    }
}

```

```

        if(balance<1000)
        {
            System.out.println("You are running out of minimum balance \nAmount
of rs 500 has been debited as service charge for having low balance");
            balance =balance - 500;
            System.out.println("Your Available Balance:"+balance);
        }
    }

class Lab5
{
    public static void main(String xx[])
    {
        Scanner S = new Scanner(System.in);
        int choice;
        System.out.println("\nPress\n 1. for Savings account \n2.for Current account");
        choice = S.nextInt();
        switch(choice)
        {
            case 1:
                Savings s1=new Savings();
                s1.setd();
                s1.display();
                s1.deposit();
                s1.intrest();
                s1.withdraw();
                break;
            case 2:
                Current c1=new Current();
                c1.setd();
                c1.display();
                c1.deposit();
                c1.withdraw();
                break;
            default : System.exit(0);
        }
    }
}

```

```
Press
1. for Savings account
2. for Current account
1
Facilities available are :
1. Withdrawal
2. Compound Interest
3. No Cheque
Enter your name :
qwe
Enter Account number :
1
Enter balance:
1000
Name : qwe
Account number : 1
Balance : 1000.0
Enter 1 to deposit :
1
Enter the amount to deposit :
1000
Enter rate of interest :
5
Enter frequency of interest applied per time period :

1
Enter time periods :
1
Interest amount=100.0
Balance amount without interest is 2000.0
Available balance after updating is : 2100.0
Enter 1 to withdraw :
1
Enter the amount you want :
100
Available balance is : 2000.0
```

3. Develop Java program to create a class Bank that maintains two kinds of account - savings account and current account. Saving account provides compound interest and withdrawal facility but no checkbook facility. Current account should have minimum balance, a fine is imposed if balance is below a certain value, no check book facility and has no interest.

A class account stores account number, account name, account type. It is the parent class.

- (a) Accept deposit from customer to update balance
- (b) Display balance
- (c) Compute and display interest
- (d) Permit withdrawal and update balance.

```
import java.util.Scanner;  
import java.lang.Math;
```

```
class Account {
```

```
    String name;
```

```
    int accno;
```

```
    double balance;
```

```
    void set() {
```

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

```
        System.out.println("Enter name and accno");
```

```
        name = s.next();
```

```
        accno = s.nextInt();
```

```
        System.out.println("Enter bank balance");
```

```
        balance = s.nextDouble();
```

```
}
```

```
    void display() {
```

```
        System.out.println("Name: " + name + " Account number: " +  
                           accno + " Balance: " + balance);
```

```
}
```

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

```
}
```

```
class CusAcc extends Account {
```

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

```
void deposit() {
```

```
int choice; System.out.println("Enter " + deposit amount);
```

```
double amount = s.nextDouble();
```

```
balance += amount;
```

```
}
```

```
void withdraw() {
```

```
int min_balance = 1000;
```

```
System.out.println("Enter am withdraw amount");
```

```
double wa = s.nextDouble();
```

```
if (balance - wa > min_balance) {
```

```
System.out.println("Now balance is " + (balance - wa));
```

```
balance = balance - wa;
```

```
} else {
```

```
System.out.println("Insufficient funds,  
line will be closed");
```

```
balance = balance - wd - 0.05 * min_balance;
```

```
}
```

```
}
```

```
class Lab5 {
```

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

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

```
int choice;
```

```
System.out.println("1. Savings Account\n2. Current  
Account");
```

```
choice = s.nextInt();
```

```
class Savings extends Account {
    Scanner s = new Scanner(System.in);
    System.out.println("1. Withdrawal\n2.
    compound interest");
    void deposit() {
        int choice;
        double deposit;
        double w;
        System.out.println("Enter 1 to deposit");
        choice = s.nextInt();
        if(choice == 1) {
            System.out.println("Enter deposit amount");
            deposit = s.nextDouble();
            balance += deposit;
        } else {
            System.out.println("Invalid");
        }
    }
    void Interest() {
        int a=5;
        System.out.println("Enter time in years");
        int t = s.nextInt();
        double w = balance * Math.pow((1+a/100),t) - balance;
        System.out.println("w + " + "interest has been added.
        Now balance is "+ balance);
    }
    void withdraw() {
        System.out.println("Enter amount to be
        withdrawn");
        w = s.nextDouble();
        if(balance-w > 0) {
            balance -= w;
            System.out.println("New balance is "+ balance );
        } else {
    }
```

if (choice == 1){

sav\_acc sav = new Sav\_acc();

sav.set();

sav.deposit();

sav.withdraw();

sav.Interest();

3 else if (choice == 2){

cus\_acc cus = new cus\_acc();

cus.set();

cus.deposit();

cus.withdraw();

cus.display();

Output :

1. Savings Account

2. Current Account

1

1. Withdrawal

2. Compound Interest

Enter name : Ans

Enter accno : 210

Enter balans : 1000

Name: Ans

Accno : 210

Balance : 1000

Enter 1 to deposit.

~~Enter 1~~

Enter deposit amount

1000

Enter & compounding time in years

1

New balance is 2100.

Bank withdrawal amount

100

∴ New balance is 2000

~~01/01/2022~~

## WEEK 6

1. Create a class Customer with the following specifications.

Private Members :

Customer\_no , Customer\_name, Qty , Price, TotalPrice, Discount, Netprice.

Methods: Public members:

1. A parameterized constructor to assign initial
2. Input( ) – to read data members. Call Calddiscount().
3. Calddiscount ( ) – To calculate Discount according to TotalPrice and NetPrice

and NetPrice

$$\text{TotalPrice} = \text{Price} * \text{Qty}$$

$$\text{TotalPrice} \geq 50000 - \text{Discount } 25\% \text{ of TotalPrice}$$

$$\text{TotalPrice} \geq 25000 - \text{Discount } 10\% \text{ of TotalPrice}$$

$$\text{Netprice} = \text{TotalPrice} - \text{Discount}$$

4. Show( ) – to display Customer details.

Develop a Java program to accept details of n customers, calculate the discounts given to them and print their complete details.

```
import java.util.Scanner;

class Customer{
    private int cust_no;
    private String cust_name;
    private int quantity;
    private float price;
    private float total_price, discount, net_price;

    Customer(){}
    Customer(int no, String name, int qua, float pri){
        cust_no = no;
        cust_name = name;
        quantity = qua;
        price = pri;
        total_price = quantity * price;
    }

    void input(){}
```

```

Scanner s=new Scanner(System.in);
System.out.println("Enter customer number,customer name,item quantity,item price");
cust_no=s.nextInt();
cust_name=s.next();
quantity=s.nextInt();
price=s.nextFloat();
total_price=quantity*price;
}

void calDiscount(){
if(total_price>=50000){
discount=(float)(total_price*0.25);
}else if(total_price>=25000){
discount=(float)(total_price*0.1);
}else{
discount=0;
}
net_price=total_price-discount;
}

void show(){
System.out.println("----Customer Details-----");
System.out.println("\n\nCustomer number: "+cust_no+"\nCustomer name:
"+cust_name+"\nQuantity: "+quantity+"\nItem price: "+price+"\nTotal price:
"+total_price+"\nDiscount: "+discount+"\nNet price: "+net_price+"\n\n");
}

}

class Lab_6{
public static void main(String x[]){
Scanner s=new Scanner(System.in);
System.out.println("Enter number of objects to be created");
int n=s.nextInt();
Customer[] c=new Customer[n];
for(int i=0;i<n;i++){
System.out.println("Enter customer number,customer name,item quantity,item price");
int no=s.nextInt();
String name=s.next();
int qua=s.nextInt();
float pr=s.nextFloat();
c[i]=new Customer(no,name,qua,pr);
c[i].calDiscount();
}
}

```

```
for(int i=0;i<n;i++){
    c[i].show();
}

}
```

```
3
Enter customer number,customer name,item quantity,item price
1 qwe 5 5000
Enter customer number,customer name,item quantity,item price
2 rty 3 10000
Enter customer number,customer name,item quantity,item price
3 yui 6 20000
-----Customer Details-----

Customer number: 1
Customer name: qwe
Quantity: 5
Item price: 5000.0
Total price: 25000.0
Discount: 2500.0
Net price: 22500.0

-----Customer Details-----

Customer number: 2
Customer name: rty
Quantity: 3
Item price: 10000.0
Total price: 30000.0
Discount: 3000.0
Net price: 27000.0

-----Customer Details-----

Customer number: 3
Customer name: yui
Quantity: 6
Item price: 20000.0
Total price: 120000.0
Discount: 30000.0
Net price: 90000.0
```

2.

Develop a Java program to create a class Patient with data members pt\_id, pt\_name, pt\_age, doc.

The program should include the following functionalities.

- Accept n patient details.
- Accept a patient id and display his/her details.
- Accept the name of the doctor and display the names of all the patients treated by him/her.

```
import java.util.Scanner;

class Patient{
int p_id;
String p_name;
int p_age;
String doc;

void set(){
System.out.println("Enter patient ID, name, age and attending doctor");
Scanner s=new Scanner(System.in);
p_id=s.nextInt();
p_name=s.next();
p_age=s.nextInt();
doc=s.next();
}

void display(){
System.out.println("----Patient Details---\n");
System.out.println("Patient ID: "+p_id+"\nPatient name: "+p_name+"\nAge:
"+p_age+"\nAttending doctor: "+doc);
}
}

class Lab_62{
public static void main(String x[]){
System.out.println("Enter number of patients");
Scanner s=new Scanner(System.in);
int n=s.nextInt();
Patient[] p=new Patient[n];
```

```

for(int i=0;i<n;i++){
p[i]=new Patient();
p[i].set();
}
int choice;
do{
System.out.println("Enter choice\n1.Patient details\n2.Patients grouped by doctor\n3.Exit");
choice=s.nextInt();
if(choice==1){
System.out.println("Enter patient ID");
int id=s.nextInt();
int i;
for(i=0;i<n;i++){
if(p[i].p_id==id){
p[i].display();
break;
}
}
if(i==n){
System.out.println("Patient died");
}
}
else if(choice==2){
System.out.println("Enter doctor name");
int i;
String d=s.next();
for(i=0;i<n;i++){
if(p[i].doc==d){
System.out.println(p[i].p_name);
break;
}
}
if(i==n){
System.out.println("Doctor died");
}
}
}while(choice!=3);

}
}

```

```
Enter the number of patients:  
2  
Enter patient id, name, age and doctor name:  
1 qw 23 wqe  
Enter patient id, name, age and doctor name:  
2 er 34 qwr  
1:Enter patient ID  
2:Enter Doctor name  
3:Exit  
1  
Enter patient ID:  
1  
1 qw 23 wqe  
1:Enter patient ID  
2:Enter Doctor name  
3:Exit  
2  
Enter dooctor name:  
wqe  
1 qw 23 wqe  
1:Enter patient ID  
2:Enter Doctor name  
3:Exit  
3
```

3.

Create an abstract class Calculate which has three double members -say x, y and result. Include a method calc. Derive three classes from Calculate which performs any three arithmetic operations on the two variables x and y and assign the result to the variable result.

Make appropriate declarations and definitions.

```
import java.util.Scanner;
```

```
abstract class Calculate{  
    double x,y,result;  
    abstract void calc();  
}  
  
class Addition extends Calculate{  
    void calc(){  
        System.out.println("Enter two numbers x and y for addition : ");  
        Scanner SS = new Scanner(System.in);  
        x = SS.nextDouble();  
        y = SS.nextDouble();  
        result = x + y;  
        System.out.println("Addition of " + x + " and " + y + " is : " + result);  
    }  
}
```

```

        }
    Addition(){}
}

class Subtraction extends Calculate{
void calc(){
    System.out.println("Enter two numbers x and y for subtraction : ");
    Scanner SS = new Scanner(System.in);
    x = SS.nextDouble();
    y = SS.nextDouble();
    result = x - y;
    System.out.println("Subtraction of " + x + " and " + y + " is : " + result);
}
Subtraction(){}
}

class Multiplication extends Calculate{
void calc(){
    System.out.println("Enter two numbers x and y for multiplication : ");
    Scanner SS = new Scanner(System.in);
    x = SS.nextDouble();
    y = SS.nextDouble();
    result = x * y;
    System.out.println("Multiplication of " + x + " and " + y + " is : " + result);
}
Multiplication(){}
}

class Division extends Calculate{
void calc(){
    System.out.println("Enter two numbers x and y for division : ");
    Scanner SS = new Scanner(System.in);
    x = SS.nextDouble();
    y = SS.nextDouble();
    result = x / y;
    System.out.println("Division of " + x + " and " + y + " is : " + result);
}
Division(){}
}

class Three{
public static void main(String XX[]){
    Addition A = new Addition();
    A.calc();
}

```

```
Subtraction S = new Subtraction();
S.calc();
Multiplication M = new Multiplication();
M.calc();
Division D = new Division();
D.calc();
}
}
```

```
Enter two numbers x and y for addition :
1 2
Addition of 1.0 and 2.0 is : 3.0
Enter two numbers x and y for subtraction :
1 2
Subtraction of 1.0 and 2.0 is : -1.0
Enter two numbers x and y for multiplication :
1 2
Multiplication of 1.0 and 2.0 is : 2.0
Enter two numbers x and y for dividion :
1 2
Division of 1.0 and 2.0 is : 0.5
```

## WEEK 7

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 ("Negative age can't be accepted");
    }
}

class AgeException extends Exception {
    public String toString() {
        return ("Son can't be older than father");
    }
}

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();
    }
}
}

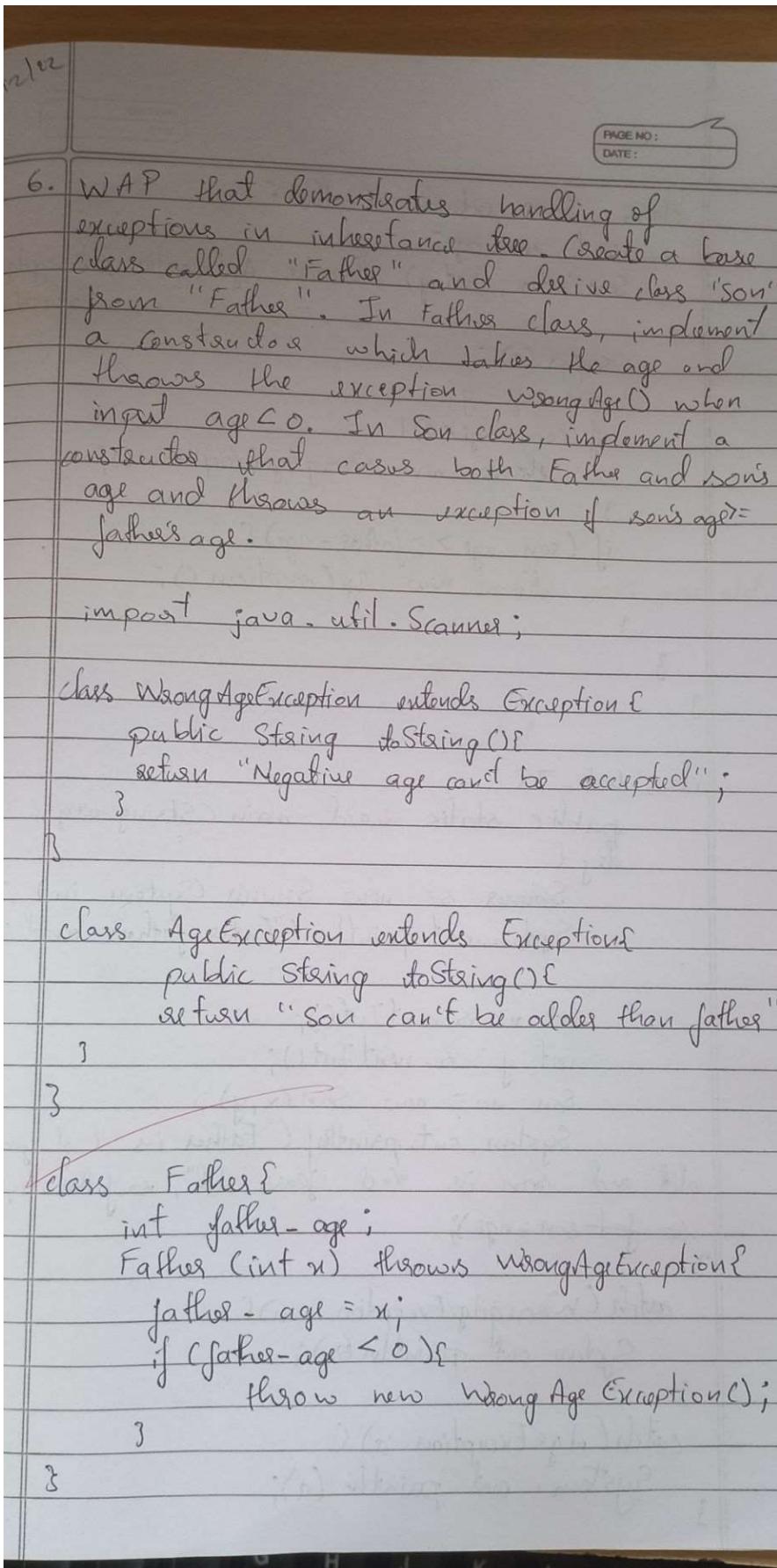
class Lab_7 {
    public static void main(String[] args) {
        try {
            Scanner s = new Scanner(System.in);
            System.out.println("Enter father's and son's ages");
            int x = s.nextInt();
            int y = s.nextInt();
            Son so = new Son(x, y);
            System.out.printf("Father is %d years old and son is %d years old", so.father_age,
so.son_age);
        } catch (WrongAgeException wa) {
            System.out.println(wa);
        } catch (AgeException a) {
            System.out.println(a);
        } catch (Exception e) {
            System.out.println("Enter valid values");
        }
    }
}
```

```
Enter father's and son's ages
35 15
Father is 35 years old and son is 15 years old
```

```
Enter father's and son's ages
-98 90
Negative age can't be accepted
```

```
Enter father's and son's ages
34 -9
Negative age can't be accepted
```

```
Enter father's and son's ages  
23 32  
Son can't be older than father
```



```

PAGE NO. _____
DATE: _____
```

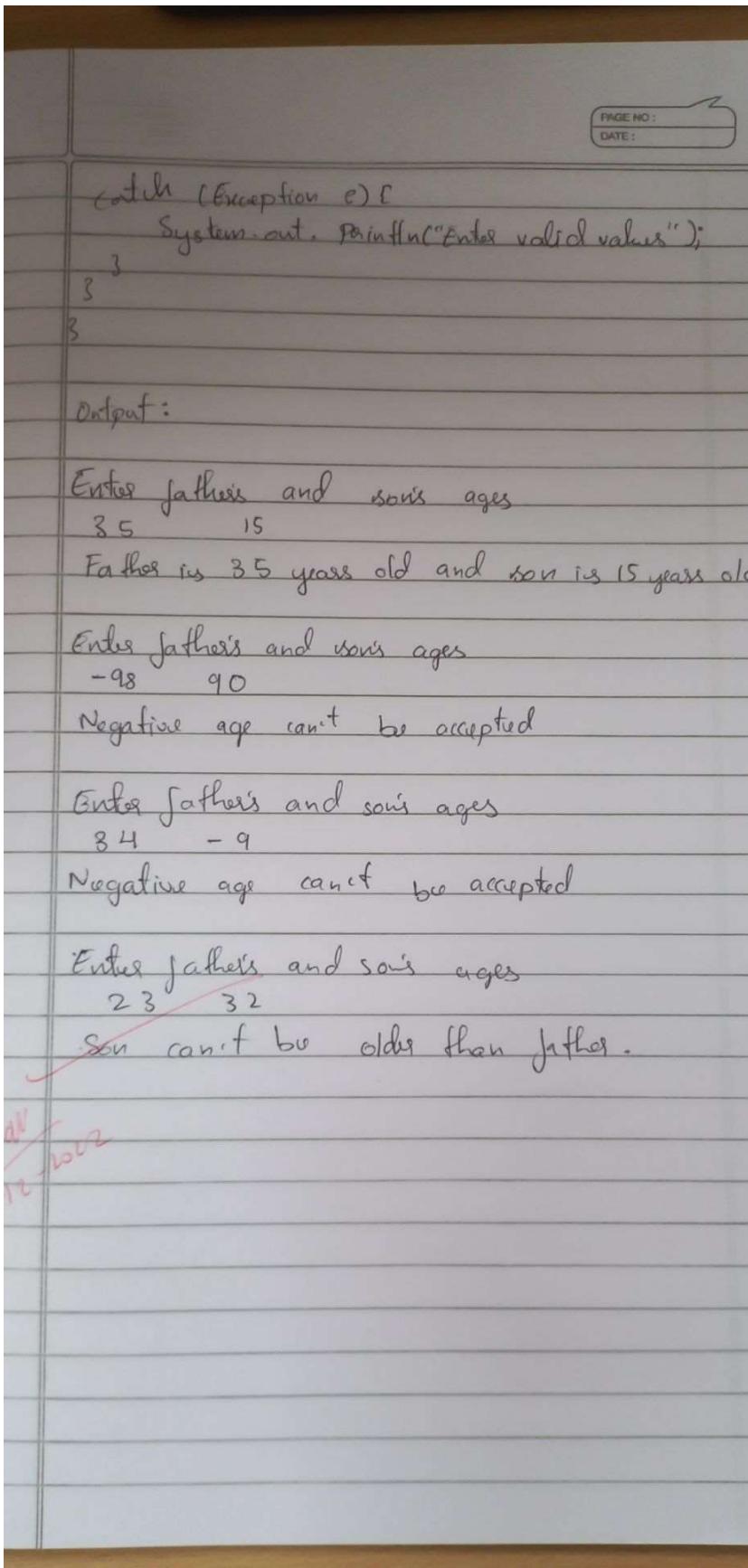
```

class Son extends Father {
    int son-age;
    Son(int x, int y) throws AgeException, WrongAge
        Exception
    {
        super(x);
        son-age = y;
        if (son-age < 0)
            throw new WrongAgeException();
    }
    if (son-age >= father-age)
        throw new AgeException();
    }

}

class Lab_7 {
    public static void main (String args[])
    {
        Scanner s = new Scanner (System.in);
        System.out.println ("Enter father and son
age");
        int x = s.nextInt();
        int y = s.nextInt();
        Son so = new Son (x,y);
        System.out.print ("Father is " + x + " years
old and son is " + y + " years old", so.father-age,
so.son-age);
    }
    catch (WrongAgeException wa)
    {
        System.out.println (wa);
    }
    catch (AgeException a)
    {
        System.out.println (a);
    }
}

```



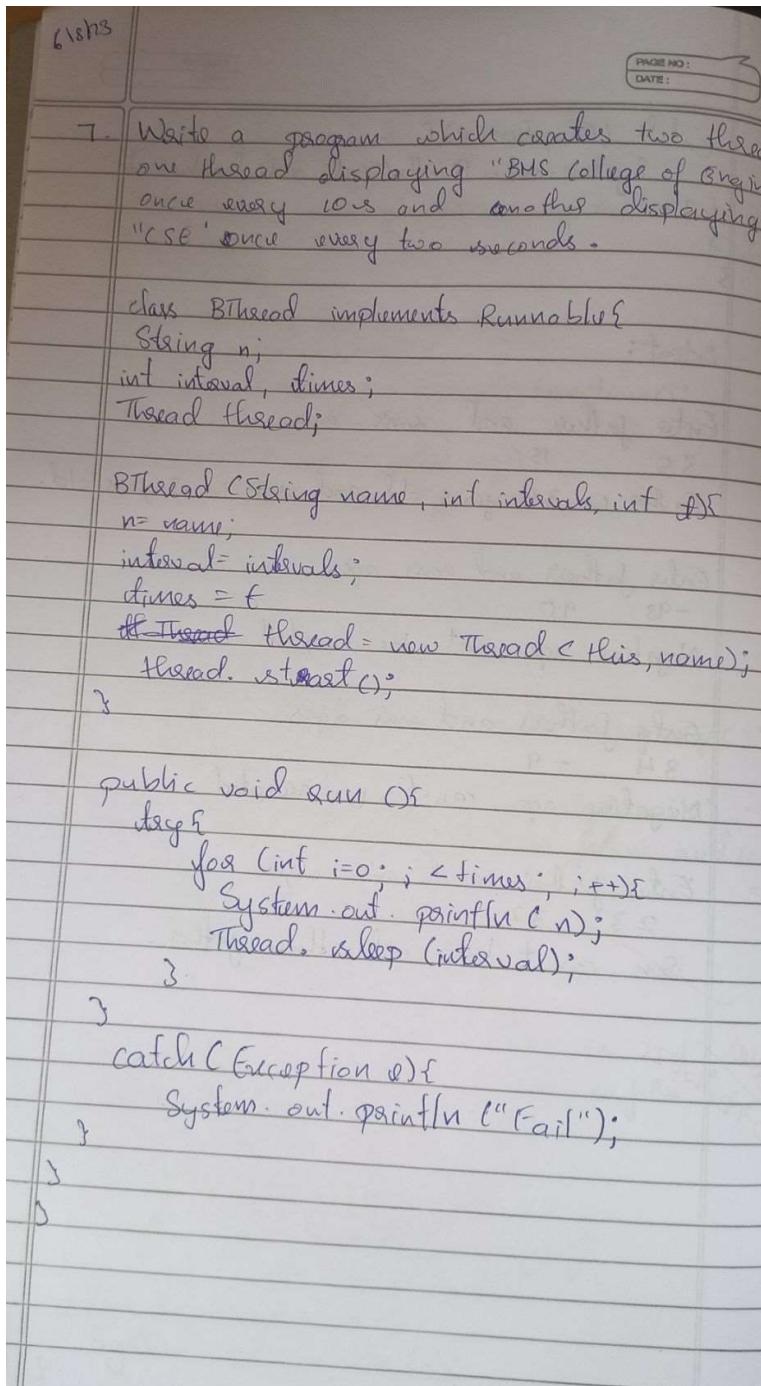
## WEEK 8

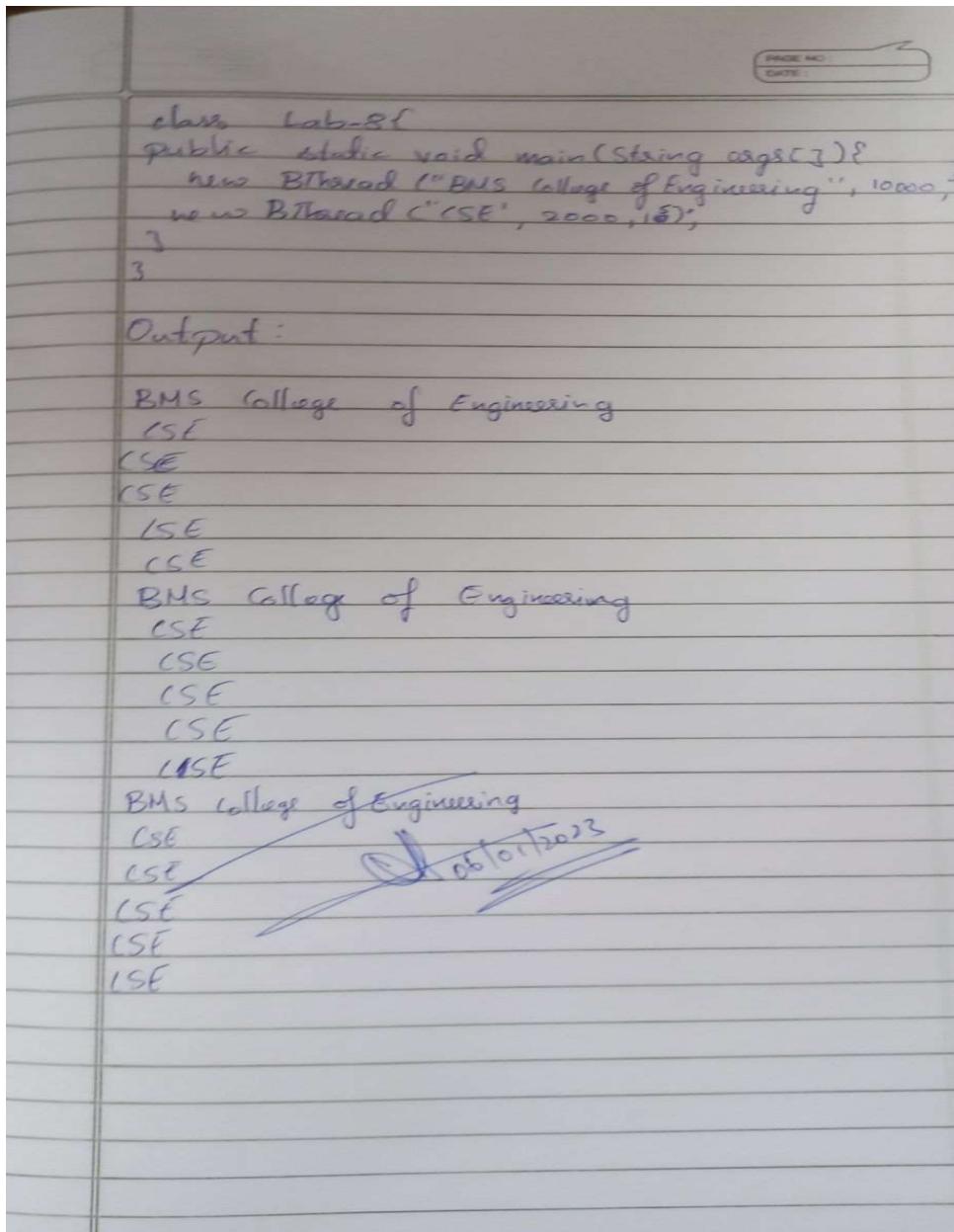
Write a program which creates two threads, one thread displaying “BMS College of Engineering” once every ten seconds and another displaying “CSE” once every two seconds.

```
class BThread implements Runnable{
String n;
int interval,times;
Thread thread;
BThread(String name,int intervals,int t){
n=name;
interval=intervals;
times=t;
thread=new Thread(this,name);
thread.start();
}
public void run(){
try{
for(int i=0;i<times;i++){
System.out.println(n);
Thread.sleep(interval);
}
}
catch(Exception e){
System.out.println("Fail");
}
}
}

class Lab_8{
public static void main(String args[]){
new BThread("BMS College of Engineering",10000,2);
new BThread("CSE",2000,10);
}
}
```

```
C:\Users\bmscecse\Desktop\1BM21CS030>java Lab_8
){
  BMS College of Engineering
  ("F
   CSE
   CSE
   CSE
   CSE
   CSE
   BMS College of Engineering
   CSE
   maCSE
   CollCSE
   ,200CSE
   CSE
```





## WEEK 9

Create a package CIE which has two classes- Student and Internals. The class Personal has members like usn, name, sem. The class Internals has an array that stores the internal marks scored in five courses of the current semester of the student. Create another package SEE which has the class External which is a derived class of Student. This class has an array that stores the SEE marks scored in five courses of the current semester of the student. Import the two packages in a file that declares the final marks of n students in all five courses.

```
package CIE;

public class Internals extends Student{
    public int[] marks=new int[5];

    public void setint(int[] a){
        for(int i=0;i<5;i++){
            marks[i]=a[i];
        }
    }

    public void getint(){
        System.out.println("Internal marks");
        for(int i=0;i<5;i++){
            System.out.println("Subject "+i+": "+marks[i]);
        }
    }
}

package CIE;

public class Student{
    public int USN;
    public String name;
    public int sem;

    public void setdets(int u,String s,int q){
        USN=u;
        name=s;
        sem=q;
    }

    public void getdets(){
        System.out.println("Student details");
    }
}
```

```
System.out.println("USN:"+USN+"\nNAME:"+name+"\nSEMESTER:"+sem);
}

}

package SEE;

import CIE.*;

public class External extends Internals{
public int[] marksI=new int[5];

public void set(int[] a){
for(int i=0;i<5;i++){
marksI[i]=a[i];
}
}

public void get(){
for(int i=0;i<5;i++){
System.out.println("External marks");
System.out.println("Subject "+i+": "+marksI[i]);
}
}

import CIE.*;
import SEE.*;
import java.util.Scanner;

class Test{
public static void main(String args[]){
Scanner s=new Scanner(System.in);
System.out.println("Enter number of students");
int n=s.nextInt();
External[] dets=new External[n];

for(int i=0;i<n;i++){
System.out.println("Enter student details");
int usn=s.nextInt();
String name=s.next();
int sem=s.nextInt();
```

```
System.out.println("Enter internal marks");
int[] intr=new int[5];
for(int j=0;j<5;j++){
intr[j]=s.nextInt();
}

dets[i]=new External();
dets[i].setdets(usn,name,sem);
dets[i].setint(intr);

System.out.println("Enter external marks");
for(int j=0;j<5;j++){
intr[j]=s.nextInt();
}

dets[i].set(intr);

}

for(int i=0;i<n;i++){
dets[i].getdets();
dets[i].getint();
dets[i].get();

System.out.println("Final marks");
for(int j=0;j<5;j++){
System.out.println("Subject "+j+": "+(dets[i].marks[i][j]/2+dets[i].marks[j]));
}
}

}
```

```
Enter number of students
1
Enter student details
1 aqw 2
Enter internal marks
12 12 12 12 12
Enter external marks
12 12 12 12 12
Student details
USN:1
NAME:aqw
SEMESTER:2
Internal marks
Subject 0: 12
Subject 1: 12
Subject 2: 12
Subject 3: 12
Subject 4: 12
External marks
Subject 0: 12
External marks
Subject 1: 12
External marks
Subject 2: 12
External marks
Subject 3: 12
External marks
Subject 4: 12
Final marks
Subject 0: 18
Subject 1: 18
Subject 2: 18
Subject 3: 18
Subject 4: 18
```

8. Create two packages - CIE and SEE. CIE with two classes Student and Internals. SEE with External marks. Create a list of n students.

1: package CIE;

public class Student {

int USN;

String name;

int sem;

public void setdet (int u, String a, int s) {

USN = u;

name = a;

sem = s;

}

public void getdet () {

System.out.println ("USN: " + USN + " NAME: " + name + "

sem: " + sem);

}

package CIE;

public class Internals extends Student {

int [] marks = new int [5];

public void setdm (int i, a) {

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

marks[i] = a[i];

```
public void getm() {
    for (int i=0; i<5; i++) {
        System.out.println("Subject "+(i+1) + ":" + marks[i])
    }
}
```

```
3: package SEE;
import CIF.*;
public class External extends Internal {
    int[] marks = new int[5];
```

```
public void set (int a) {
    for (int i=0; i<5; i++) {
        marks[i] = a;
    }
}
```

```
public void get () {
    for (int i=0; i<5; i++) {
        System.out.println("Subject "+(i+1) + marks[i])
    }
}
```

```
1: import java.util.Scanner;
import CIF.*;
import SEE.*;
```

```
class Test {
    public static void main (String args[]) {
```

Scanner s = new Scanner (System.in);  
System.out.println ("Enter number of students");

int n = s.nextInt();

External[] det = new External[n];

for (int i=0; i < n; i++) {

System.out.println ("Enter student details");

int u = s.nextInt();

String ss = s.next();

int a = s.nextInt();

External det[i] = new External();

det[i].setdet (u, ss, a);

System.out.println ("Enter internal marks");

int[] m = new int[5];

for (int j=0; j < 5; j++) {

m[j] = s.nextInt();

}

det[i].setm (m);

System.out.println ("Enter external marks");

for (int j=0; j < 5; j++) {

m[j] = s.nextInt();

}

det[i].set (m);

}

for

for (int i=0; i < n; i++) {

det[i].getdet();

det[i].getm();

```
det[i].get();
```

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

```
System.out.println ("Sub "+(j+1)+" "+det[i].marks[j]  
+det[i].marks[i][j])
```

```
}
```

```
)
```

```
)
```

Output

Enter number of students  
1

Enter student details

1 a 2

Enter external marks

12 12 12 12 12

Enter internal marks

12 12 12 12 12

USN: 1

NAME: a

SEM: 2

Subject 1: 12

Subject 2: 12

Subject 3: 12

Subject 4: 12

Subject 5: 13

PAGE NO :  
DATE :

Subject 1 : 12

Subject 2 : 12

Subject 3 : 12

Subject 4 : 12

Subject 5 : 12

Subject 1 : 18

Subject 2 : 18

Subject 3 : 18

Subject 4 : 18

Subject 5 : 18

~~✓ 15/02/2023~~