QUADRATIC

```
import java.util.Scanner;

class Quad {
    double a,b,c,d;
    Scanner s = new Scanner(System.in);
    void input() {
        System.out.println("Enter coefficients
                            a and b : ");
        a = s.nextDouble();
        b = s.nextDouble();
        c = s.nextDouble();
    }
void calculate() {
    if (a==0) {
        System.out.println("Not quadratic");
        return;
    }
    d = b*b - 4*a*c;
    if (d==0) {
        double x1 = (b)/2*a;
    System.out.println("Roots are real
                        and equal");
    System.out.println("x1 = x2 =" +
                        (float) x1);
    }
if (d<0) {
        double x1 = (-(b)/2*a);
        double x2 = (Math.sqrt(Math.abs(d))
                    /2*a;
System.out.println("Roots are imaginary");
System.out.println("x1 =" +(float)x1+
                    "i: x2 =" +(float)x2);
```

```
if (d>0){
    double x1 = -(b)+Math.sqrt(d)/2*a;
    double x2 = -(b)-Math.sqrt(d)/2*a;
System.out.println("Roots are real and unequal");
System.out.println("x1 = " + (float)x1 +
                   "\nx2 = " + (float)x2);
}
}
}

public class pgm2{
    public static void main(String args[]){
        Quad exp1 = new Quad();
        exp1.inputabc();
        exp1.calculate();
    }
}
```

OUTPUT:

```
Enter a,b,c : 1,2,1
Roots are real and equal : -1.0
Enter a,b,c : 5 4 5
Roots are imaginary
x1 = -10.0 + i 22.91
x2 = -10.0 - i 22.91
```

2) Write a Java program to create class Student with members USN, name, marks, include methods for input, calculate percentage and display.

```
import java.util.Scanner;
class Student {
    String USN;
    String name;
    int marks[] = new int[5];
```

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

void setMarks() {
    for (int i = 0; i < marks.length; i++)
    {
        System.out.println("Enter the marks
                for subject " + (i+1) + ": ");
        marks[i] = s.nextInt();
    }
}

void setDetails() {
    System.out.println("Enter the USN:");
    USN = s.next();
    System.out.println("Enter the name:");
    name = s.next();
    this.setMarks();
}
void display() {
    System.out.println("");
    System.out.println("USN: "+USN);
    System.out.println("Name: "+name);
    System.out.println("Marks: ");
for (int i=0; i<marks.length; i++)
    {
        System.out.println("Subject "
                + (i+1) + ". " +
                marks[i]);
int calculateTotal(){
    int Total = 0;
for (int i=0; i<marks.length; i++
    {
        total += marks[i];
    } return total;
}
```

```
float percent () {
    float percentage ;
    int totalMarks = calculateTotal ();
    percentage = (totalMarks / 600.0f) * 100;
    return percentage ;
}
}
public class DataDemo {
    public static void main (String args[])
    {
        Scanner scanner = new Scanner (System.in);
        System.out.println ("Enter the number of
                            students");
        int numberOfStudents = scanner.nextInt();
        Student [] students = new Student
                              [numberOfStudents];
        for (int i=0 ; i<numberOfStudents ; i++)
        {
            students [i] = display ( ) ;
            int totalMarks = students [i].calculateTotal
                             ();
            System.out.println ("Total marks :" +
                                totalMarks );
            float percentage = students [i].percentage
                               ();
            System.out.println ("Percentage :" +
                                percentage + "%");
        }
    }
}
```

OUTPUT:

Enter the USN: 1BM22CS062
Enter the Name: Aymaan
Enter the marks for subject 1: 77
Enter the marks for subject 2: 90
Enter the marks for subject 3: 90
Enter the marks for subject 4: 99
Enter the marks for subject 5: 99
Enter the marks for subject 6: 99

USN: 1BM22CS062
Name: aymaan
Marks
Subject 1: 77
Subject 2: 90
Subject 3: 90
Subject 4: 99
Subject 5: 99
Subject 6: 99
Total Marks: 564
Percentage: 93%

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21B-3

Create a class Book which contains four members : name, author, price, num pages. Include a constructor to set the value 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 books{
    String author, book;
    int price, numpages;

    books(String book, String author, int price,
          int numPages){
        this.book = book;
        this.author = author;
        this.price = price;
        this.numpages = numPages;
    }
    public String toString(){
    return "Book Name" +this.book+"\n"+
        "Author :" +this.author+"\n"+"Price
        +this.price+"\n"+"Number of
        pages :" +this.numpages+"\n";
    }
}
```

```
class Ub{
    public static void main (String args[]){
        String author, book;
        int price, numPages;
        int num_book;
        Scanner input = new Scanner(System.in);
        System.out.print("Enter number of books:");
        num_book = input.nextInt();
        System.out.print("\n");

        book b[] = new books[num_book];
        for(int i=0; i<num_book; i++){
            System.out.println("--->>InBook" +
                                (i+1) + "\n-->>");
            input.nextLine();
            System.out.print("Enter the name of book:");
            book = input.nextLine();

            System.out.print("Enter Authors name:");
            author = input.nextLine();

            System.out.print("Enter the price:");
            price = input.nextInt();

            System.out.print("Enter the number of
                              pages:");
            numPages = input.nextInt();
            b[i] = new books(book, author, price,
                             numPages);
        }
        for(int i=0; i<num_book; i++){
            System.out.println("--->>InBook"+(i+1)+
                               "details\n-->>");
            String a = b[i].toString();
```

System.out.println(a);
}
}

OUTPUT:
Enter the number of books : 1

Book 1
Enter the name of book : Harry Potter
Enter Authors name : JK Rowling
Enter the price : 500
Enter the number of pages : 762

Book 1 details
Book Name : Harry Potter
Author : JK Rowling
Price : 500
Number of pages : 762

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LAB-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 contains only the method printArea() that prints the area of the given shape.

```
import java.util.Scanner;

class inputScanner{
    void rec(Rectangle ab){
        Scanner input = new Scanner
                        (System.in);
        System.out.println("Enter the
            dimensions of the rectangle
            (Length and Breadth):");
        ab.a = input.nextInt();
        ab.b = input.nextInt();
    }
    void tri(Triangle tb){

        Scanner input = new Scanner(System.in
        System.out.println("Enter the dimensions
                            of the triangle (base and
                                height):");
        tb.a = input.nextInt();
        tb.b = input.nextInt();
    }
```

```
void in(circle ob){
    Scanner input = new Scanner(System.
    System.out.println("Enter the dimension
        of the circle (radius):");
    ob.a = input.nextInt();
}
}

abstract class shape extends inputScanner
{
int a,b;
abstract void printArea();
}

class rectangle extends shape{
    rectangle(){
        rec(this);
    }
void printArea(){
    System.out.println("Area of Rectangle
                = "+(double)(a*b));
}
}
class triangle extends shape{
    triangle(){ tri(this); }
    void printArea(){
        System.out.println("Area of
            Triangle= "+(0.5*a*b));
    }
}
```

```
class circle extends Shape{
    circle(){ super(this); }
    void printArea(){
        System.out.println("Area of circle
            =" + (3.14 * a * a));
    }
}
class calc{
    public static void main(String args[])
    {
        rectangle r = new rectangle();
        triangle t = new triangle();
        Circle c = new circle();
        r.printArea();
        t.printArea();
        c.printArea();
    }
}
```

Enter the dimension of the rectangle (length and Breadth): 5 4

Enter the dimensions of the triangle (base and height): 2 3

Enter the dimension of the circle(radius):
5

Area of Rectangle = 20.0
Area of Triangle = 3.0
Area of circle = 78.5

LAB-5

Develop a Java program to create a class Bank

```
import java.util.Scanner;
class Account {
    String name;
    int accountNumber;
    double balance = 0;
    Scanner scanner = new Scanner(System.in);

Account(String accountType) {
    System.out.println("Creating a new " +
            accountType + " account");
    System.out.print("Enter name: ");
    this.name = scanner.next();
    System.out.print("Enter account number: ");
    this.accountNumber = scanner.nextInt();
}

void deposit() {
    System.out.print("Enter deposit amount: ");
    balance += scanner.nextDouble();
System.out.println("Deposit successful. Current balance: " + balance);
}
void withdraw() {
    System.out.print("Enter withdrawal amount: ");
    double withdrawal = scanner.nextDouble();
if (withdrawal <= balance) {
    balance -= withdrawal;
System.out.println("Withdrawal successful. Current balance: " + balance);
}
```

else {
System.out.println("Insufficient funds for withdrawal");
}
}
void displayBalance() {
System.out.println("Current balance:" + balance);
}
void performMenuActions() {
int choice;
do {
System.out.println("\n---MENU---");
System.out.println("1. Deposit");
System.out.println("2. Withdraw");
System.out.println("3 Display Balance");
System.out.println("4. Exit");
System.out.println("Enter your choice:");
choice = scanner.nextInt();

switch(choice) {
case 1: deposit();
break;
case 2:
withdraw();
break;
case 3: displayBalance();
break;
case 4: System.out.println("Exiting the menu");
break;
default: SOP("Invalid choice");
}
} while(choice != 4);
}
}

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```
class SavingsAccount extends Account {
    int interestRate = 5;

    SavingsAccount() {
        super("Savings");
    }
    void compoundInterest(int time) {
        balance += Math.pow((1 + (interestRate
                / 100.0)), time);
        System.out.println("Compound interest
            applied, Current balance: " + balance);
    }
}
class CurrentAccount extends Account {
    double overdraftLimit = -100;
    CurrentAccount() {
        super("Current");
    }
    void issueCheque() {
        System.out.println("Enter cheque amount:");
        double chequeAmount = scanner.nextDouble();
        if (chequeAmount <= balance && (balance -
                chequeAmount) >= overdraftLimit) {
            balance -= chequeAmount;
            System.out.println("Cheque issued");
        } else {
            System.out.println("Insufficient funds");
        }
    }
}
```

```
public class bank {
    public static void main (String[] args) {
    Scanner scanner = new Scanner (System.in);
        SoP ("Welcome to the banking App");

Savings Account savingsAccount = new SavingsAccount
                                    ();
CurrentAccount currentAccount = new CurrentAccount
                                    ();
Account selectedAccount = null;
System.out.println ("\n Select an account
                        type:");
System.out.println ("1. Savings Account");
System.out.println ("2. Current Account");

int accountTypeChoice = scanner.nextInt();

if (accountTypeChoice == 1) {
        selectedAccount = savingAccount;
} else if (accountTypeChoice == 2) {
        selectedAccount = currentAccount;
} else {
        System.out.println ("Invalid choice");
        System.exit (0);
}
selectedAccount.performMenuActions();
scanner.close();
}
}
```

OUTPUT: Creating a new CurrentAccount
Enter name: Ayman
Enter account number: 5678
Select an account type:
1) Savings Account
2) Current Account

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--- MENU ---
1) Deposit
2) Withdraw
3) Display Balance
4) Exit.
Enter your choice: 1
Enter deposit amount: 30000
Deposit successful; Current balance: 300000

--- MENU ---
1) Deposit
2) Withdraw
3) Display Balance
4) Exit
Enter your choice: 2
Enter withdrawal amount: 15000
Withdrawal successful. Current balance. 285000

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PACKAGES

MAIN:

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

public class Main {
    public static void main (String[] args) {
        int n;
        Scanner sc = new Scanner (System.in);
        int [] finalMarks = new int [5];
System.out.println (" Enter number of students : ");

    n = sc.nextInt ();
Internals [] finalI = new Internals [n];
External[] finalE = new External [n];

for (int i =0; i <n; i++) {
    finalI[i] = new Internals ();
    finalE [i] = new External ();
System.out.println (" Enter Name of student "+(i+1));
finalI [i].USN = sc.next ();
System.out.println (" Enter marks obtained
                    in internals for student"
                    +(i+1));
for( int j=0 ; j<5; j++) {
    final [i].marksInternal [j] = sc.nextInt();
}
SOP (" Enter marks obtained in External: ")
    for (int j = 0; j <5; j++) {
        final E[i] .marksExternal[j] = sc.nextInt
        ();
    }
    for (int j=0 ; j<5; j++) {
        finalE [i] .marksExternal [j] /= 2
}
```

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Student.:

```
package CIE;
public class Student {
    public String USN;
    public String name;
    public int sem;
}
```

Internals:

```
package CIE;
public class Internals extends Student {
    public int [] marks Internal = new int[5]
}
```

Externals:

```
package SEE;
import CIE.Student;
public class Externals extends Studen
    {
        public int [] marks External
            = new int [5];
}
```

OUTPUT

Enter number of students:
1
Enter name of student:
Ayman
Enter USN of student:
1BM22CS062
Enter the current semester of student:
3
Enter marks obtained in Internals for student:
45 44 46 47 49
Enter marks obtained in Externals for student:

90 91 94 96 95

Final marks for Ayman of USN: 1BM22CS062 studying in Sem: 3 has total marks:

90
89
93
95
94

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LAB-7

1) Write a program that demonstrates handling of exceptions in inheritance tree. Create a base called "Father" and derived class called "Son" which extends the base class. Throw the WrongAge exception when age ≤ 0 and son's age is greater than father's age.

```
class WrongAgeException extends Exception {
    WrongAgeException(String message) {
        super(message);
    }
}

class Father {
    Father(int fathersAge) throws WrongAgeException {
        if (fathersAge < 0)
            throw new WrongAgeException("Father's age is not valid");
        else
            System.out.println("The father is " + fathersAge + " years old");
    }
}
```

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```
class Son extends Father {
    Son (int fatherAge, int sonAge)
        throws WrongAgeException {
    super (fathersAge);
    if(sonsAge >= fathersAge) {
        throw new WrongAgeException
        (message: "Sons age is not valid")
    } else {
        System.out.println("The father is " +
            fathersAge + " years old and
    the son is " + sonsAge + " years
        old");
```

```
public class ExceptionHandling {
    public static void main (String args[])
    {
        try {
            Father f = new Father (
                fathersAge: 50);
            Son s = new Son (-1, sonsAge: 90);
    } catch (WrongAgeException e) {

        System.out.println("Exception: " +
                e.getMessage());
    }
}
```

OUTPUT: Exception in thread "main"
WrongAge: Age cannot be
negative

Father f = new Father (50)
Son s = new Son (50, 90)
OUTPUT: Exception in thread "main"
WrongAge: Sons age should be less
than Fathers age.

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LAB - 8

WAP which creates two threads, one thread displaying "BMS College of Engineering" once every ten seconds and another displaying "CSE" once every two seconds.

```
Class One extends Thread {
    public void run () {
        try {
            while (true) {
                System.out.println ("BMS Ollege of
                                    Engineering");
                Thread.sleep (10000);
            }
        }
        catch (InterruptedException e)
        {
            System.out.println (e);
        }
    }
}
class Two extends Thread {
    public void run () {
        try {
            while (true) {
                System.out.println ("CSE");
                Thread.sleep (2000);
            }
        }
        catch (InterruptedException e) {
            System.out.println (e);
        }
    }
}
```

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

        Thread t1 = new One();
        Thread t2 = new Two();
        t1.start();
        t2.start();
    }
}
```

OUTPUT: BMS College of Engineering
CSE
CSE
CSE
CSE
CSE
BMS College of Engineering
CSE
.
.
.