

```

import java.util.Scanner;
import java.math.*;
class Quadratic
{
    int a,b,c;
    double r1,r2,d;
    void get()
    {
        Scanner s=new Scanner(System.in);
        System.out.println("Enter the coefficient of a,b,c");
        a=s.nextInt();
        b=s.nextInt();
        c=s.nextInt();
    }
    void compute()
    {
        while(a==0)
        {
            System.out.println("It is not a quadratic equation");
            System.out.println("Enter a non-zero number");
            Scanner s=new Scanner(System.in);
            a=s.nextInt();
        }
        d=b*b-4*a*c;
        if(d==0)
        {
            System.out.println("Roots are real and equal");
            r1=(-b)/(2*a);
            System.out.println("Root1=Root2="+r1);
        }
        else if(d>0)
        {
            System.out.println("Roots are real and distinct");
            r1=(-b+(Math.sqrt(d)))/(2*a);
            r2=(-b-(Math.sqrt(d)))/(2*a);
            System.out.println("Roots are"+r1+"and"+r2);
        }
        else
        {
            System.out.println("Roots are not Real");
        }
    }
}
class QuadraticMain
{
    public static void main(String SX[])
    {
        Quadratic q=new Quadratic();
        q.get();
        q.compute();
    }
}

```

}

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C:\Users\Language lab 28\Desktop\1BM22CS121>javac QuadraticMain.java

C:\Users\Language lab 28\Desktop\1BM22CS121>java QuadraticMain
Enter the coefficient of a,b,c
1 2 1
Roots are real and equal
Root1=Root2=-1.0

C:\Users\Language lab 28\Desktop\1BM22CS121>javac QuadraticMain.java

C:\Users\Language lab 28\Desktop\1BM22CS121>java QuadraticMain
Enter the coefficient of a,b,c
0 1 2
It is not a quadratic equation
Enter a non-zero number
2 1 3
Roots are not Real

C:\Users\Language lab 28\Desktop\1BM22CS121>javac QuadraticMain.java

C:\Users\Language lab 28\Desktop\1BM22CS121>java QuadraticMain
Enter the coefficient of a,b,c
3 10 1
Roots are real and distinct
Roots are -0.10319474672552342 and -3.23013858660781

C:\Users\Language lab 28\Desktop\1BM22CS121>

Lab 1

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.math.*;  
class Quadratic  
{  
    int a,b,c;  
    double r1,r2,d;  
    void get()  
    {  
        Scanner s=new Scanner (System.in);  
        System.out.println ("Enter the coefficient  
        of a,b,c");  
        a=s.nextInt();  
        b=s.nextInt();  
        c=s.nextInt();  
    }  
    void compute()  
    {  
        while(a==0)
```

```
{  
    System.out.println("It is not a quadratic  
equation");
```

```
System.out.println("Enter a non-zero number");  
Scanner s = new Scanner(System.in);  
a = s.nextInt();
```

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

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

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

```
x1 = (-b) / (2 * a);
```

```
System.out.println("Root1=Root2=" + x1);
```

```
}
```

```
else if (d > 0)
```

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

```
x1 = (-b + (Math.sqrt(d))) / (2 * a);
```

```
x2 = (-b - (Math.sqrt(d))) / (2 * a);
```

```
System.out.println("Roots are " + x1 + " and  
" + x2);
```

```
}  
else
```

```
{  
    System.out.println("Roots are not Real");
```

```
}
```

```
}
```

```
class QuadraticMain
```

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

```
{  
    Quadratic q = new Quadratic();  
    q.get();  
    q.compute();
```

```
}
```

Output:

Enter the coefficient of a,b,c
1 2 1

Roots are real and equal

Root1=Root2=1.0

Enter the coefficient of a,b,c

0 1 2

It is not a quadratic equation.

Enter a non-zero number

2 1 3

Roots are not Real

Enter the coefficient of a,b,c

3 1 0 1

Roots are real and distinct

Roots are -0.10319474672552342 and -3.23613858660

```

import java.util.Scanner;
class Student
{
    int m,grade,tot=0;
    double sum=0.0,sgpa;
    String usn;
    int mark[]={};new int[25];
    int credit[]={};new int[25];
    String name;
    Scanner s=new Scanner(System.in);
    void accept()
    {
        System.out.println("Enter the name and usn of the student");
        name=s.next();
        usn=s.next();
        System.out.println("Enter the number of subjects:");
        m=s.nextInt();
        System.out.println("Enter the marks and credits of every subject:");
        for(int j=0;j<m;j++)
        {
            System.out.println((j+1)+"."+"Marks=");
            mark[j]=s.nextInt();
            System.out.println("Credits=");
            credit[j]=s.nextInt();
        }
    }
    void display()
    {
        System.out.println("Details of Students:");
        System.out.println("NAME:"+name+" USN:"+usn);
        for(int j=0;j<m;j++)
        {
            System.out.println((j+1)+"."+"MARKS="+mark[j]+"
CREDITS="+credit[j]);
        }
        calc();
    }
    void calc()
    {
        for(int j=0;j<=m;j++)
        {
            if(mark[j]>=90)
            {
                grade=10;
            }
            else if(mark[j]>=80&&mark[j]<90)
            {
                grade=9;
            }
            else if(mark[j]>=70&&mark[j]<80)
        }
    }
}

```

```

        {
            grade=8;
        }
        else if(mark[j]>=60&&mark[j]<70)
        {
            grade=7;
        }
        else if(mark[j]>=50&&mark[j]<60)
        {
            grade=6;
        }
        else if(mark[j]>=40&&mark[j]<50)
        {
            grade=5;
        }
        else
        {
            grade=0;
        }
        tot=tot+credit[j];
        sum=sum+(grade*credit[j]);
    }
    sgpa=sum/tot;
    System.out.println("SGPA of Student:"+sgpa);
}
class Sgpa
{
    public static void main(String SS[])
    {
        Student t=new Student();
        t.accept();
        t.display();
    }
}

```

```
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```

```
C:\Users\Language lab 28\Desktop\1BM22CS121>javac Sgpa.java
```

```
C:\Users\Language lab 28\Desktop\1BM22CS121>java Sgpa
```

```
Enter the name and usn of the student
```

```
Prajna 1BM22CS121
```

```
Enter the number of subjects:
```

```
2
```

```
Enter the marks and credits of every subject:
```

```
1.Marks=
```

```
87
```

```
Credits=
```

```
2
```

```
2.Marks=
```

```
98
```

```
Credits=
```

```
3
```

```
Details of Students:
```

```
NAME:Prajna USN:1BM22CS121
```

```
1.MARKS=87 CREDITS=2
```

```
2.MARKS=98 CREDITS=3
```

```
SGPA of Student:9.6
```

```
C:\Users\Language lab 28\Desktop\1BM22CS121>
```

- d. Develop a Java Program to create class student with members USN, Name, an array credits and an array marks, include method to accept and displays details and the method to calculate SGPA of a student.

```
import java.util.Scanner;  
class student  
{  
    int m, grade, tot=0;  
    double sum=0.0, sgpa;  
    String usn;  
    int mark[] = new int[5];  
    int credit[] = new int[5];  
    String name;  
    Scanner s = new Scanner (System.in);  
    void accept()  
    {
```

System.out.println ("Enter name and usn of the student");

name = s.nextLine();

usn = s.next();

System.out.println ("Enter the number of subjects");

m = s.nextInt();

system.out.println ("Enter the marks and
credits of every subject : ");
for (int j=0; j<m; j++)

{
 system.out.println ("j+1) + " + " Marks");
 mark[j] = s.nextInt();
 system.out.println ("Credits : ");
 credit[j] = s.nextInt();
}

void display()

{
 system.out.println ("Details of Students");
 system.out.println ("NAME : " + name + " USN :
 + usn);
 for (int j=0; j<m; j++)

{
 system.out.println ("j+1) + " + " MARKS =
 + mark[j] + " CREDITS = " + credit[j]);
}

calc();

{
void calc()

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

{
 if (mark[j] >= 90)

{
 grade = 10;

}
else if (mark[j] >= 80 & mark[j] < 90)

{
 grade = 9;

}
else if (mark[j] >= 70 & mark[j] < 80)

{
 grade = 8;

}
else if (mark[j] >= 60 & mark[j] < 70)

{
 grade = 7;

}
else if (mark[j] >= 50 & mark[j] < 60)

{
 grade = 6;

}
else if (mark[j] >= 40 & mark[j] < 50)

{
 grade = 5;

```
else
{
    grade0;
}
tot = tot + credit[0];
sum = sum + (grade * credit[0]);
}
sgpa = sum / tot;
System.out.println("SGPA of Student : "
+ sgpa);
}
```

```
class Sgpa
{
    public static void main (String ss[])
    {
        Student t = new Student();
        t.accept();
        t.display();
    }
}
```

Output:

enter the name and usn of the student
Pragna USN: 1BM22CS121

enter the number of subjects:

2

Enter the marks and credits of every subject:

1. Marks =

87

Credits =

2

2. Marks =

98

Credits =

3

Details of Student:

NAME: Pragna USN: 1BM22CS121

1. MARKS = 87 CREDITS = 2

2. MARKS = 98 CREDITS = 3

SGPA of Student: 9.6

8
11/12/K

```
import java.util.Scanner;

class Book {
    String name;
    String author;
    double price;
    int numPages;
    public Book(String name, String author, double price, int numPages) {
        this.name = name;
        this.author = author;
        this.price = price;
        this.numPages = numPages;
    }
    public void setDetails() {
        Scanner scanner = new Scanner(System.in);

        System.out.print("Enter book name: ");
        this.name = scanner.nextLine();

        System.out.print("Enter author name: ");
        this.author = scanner.nextLine();

        System.out.print("Enter price: ");
        this.price = scanner.nextDouble();

        System.out.print("Enter number of pages: ");
        this.numPages = scanner.nextInt();
    }
    public void getDetails() {
        System.out.println("Book Name: " + name);
        System.out.println("Author: " + author);
        System.out.println("Price: $" + price);
        System.out.println("Number of Pages: " + numPages);
    }
    public String toString() {
        return "Book Details:\n" +
            "Name: " + name + "\n" +
            "Author: " + author + "\n" +
            "Price: $" + price + "\n" +
            "Number of Pages: " + numPages;
    }
}

public class Main {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);

        System.out.print("Enter the number of books: ");
        int n = scanner.nextInt();
```

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

for (int i = 0; i < n; i++) {
    System.out.println("\nEnter details for Book " + (i + 1) + ":");
    books[i] = new Book("", "", 0.0, 0);
    books[i].setDetails();
}
System.out.println("\nDetails of all books:");
for (int i = 0; i < n; i++) {
    System.out.println("\nBook " + (i + 1) + ":");

    books[i].getDetails();
}
System.out.println("\nComplete details of all books:");
for (int i = 0; i < n; i++) {
    System.out.println("\nBook " + (i + 1) + ":\n" + books[i].toString());
}
}
```

3. Create a class Book which contains four members : name, author, price, numPages.
Include a constructor to set the values for the members. Include methods to set and get the details of the object. Include a toString() method so that it could display the complete detail of the book. Develop a Java program to create n book objects.

```
import java.util.Scanner;  
class Book  
{  
    String name;  
    String author;  
    double price;  
    int numPages;  
  
    public Book (String name, String author,  
                double price, int numPages)  
    {  
        this.name = name;  
        this.author = author;  
        this.price = price;  
        this.numPages = numPages;  
    }  
  
    Scanner scanner = new Scanner (System.in);  
    System.out.print ("Enter book name: ");
```

```
this.name = scanner.nextLine();  
System.out.print ("Enter author name: ");  
this.author = scanner.nextLine();  
System.out.print ("Enter price: ");  
this.price = scanner.nextDouble();  
System.out.print ("Enter number of pages: ");  
this.numPages = scanner.nextInt();  
}  
  
public void getDetails()  
{  
    System.out.println ("Book Name: " + name);  
    System.out.println ("Author: " + author);  
    System.out.println ("Price: $" + price);  
    System.out.println ("Number of Pages: " +  
        numPages);  
}  
  
public String toString()  
{  
    return ("Book Detail:\n" + "Name: " +  
        name + "\n" + "Author: " + author + "\n" +  
        "Price: $" + price + "\n" + "Number of  
        Pages: " + numPages);  
}
```

```
public class Main {
```

```
{
```

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

```
{
```

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

```
        System.out.print ("Enter the no. of books : ");
```

```
        int n = s.nextInt();
```

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

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

```
{
```

```
            System.out.print ("Enter details of
```

```
Book " + (i+1) + ":" );
```

```
        books[i] = new Book ("", "", 0.0, 0);
```

```
        books[i].getDetails();
```

```
}
```

~~```
 System.out.println ("InBook" + (i+1) + ":");
```~~~~```
        books[i].getDetails();
```~~~~```
{
```~~~~```
        System.out.println ("Incomplete detail of all  
books");
```~~~~```
 for (int i=0; i<n; i++)
```~~~~```
{
```~~~~```
 System.out.println ("InBook" + (i+1) + ":");
```~~~~```
        " : " + books[i].toString());
```~~~~```
{
```~~~~```
,
```~~

Output :

Enter the number of books : 2

Enter details for Book 1:

Enter book name: Book One

Enter author name: Author One

Enter price: \$5.5

Enter number of pages: 200

Enter details for Book 2:

Enter book name: Book Two

Enter author name: Author Two

Enter price: 30.0

Enter number of pages: 300

Details of all books:

Book 1:

Book Name: Book One

Author: Author One

Price: \$5.5

Number of Pages: 200

Book 2:

Book Name: Book Two

Author : Author Two

Price : \$30.0

Number of Pages : 300

Complete Details of all Books

Books

Book 1 :

Book Details :

Name : Book One

Author : Author One

Price : \$25.5

Number of Pages : 200

BOOK 2 :

Book Details :

Name : Book Two

Author : Author Two

Price : \$30.0

Number of Pages : 300

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```

import java.util.Scanner;
import java.lang.Math.*;
abstract class Shape
{
    int x,y;
    abstract double printarea();
}
class Rectangle extends Shape
{
    double printarea()
    {
        return x*y;
    }
}
class Triangle extends Shape
{
    double printarea()
    {
        return 0.5*x*y;
    }
}
class Circle extends Shape
{
    double printarea()
    {
        return Math.PI*x*x;
    }
}
class Sarea
{
    public static void main(String XX[])
    {
        int x,y,ch;double area;boolean p=true;
        Rectangle s1=new Rectangle();
        Triangle t=new Triangle();
        Circle c=new Circle();
        Scanner s=new Scanner(System.in);
        while(p==true)
        {
            System.out.println("Enter following choices to find area of
shapes of your choice 1.Rectangle 2.Triangle 3.Circle");
            ch=s.nextInt();
            switch(ch)
            {
                case 1:
                {
                    System.out.println("Enter the length
and breadth of the rectangle:");
                    s1.x=s.nextInt();
                    s1.y=s.nextInt();

```

```
        area=s1.printarea();
        System.out.println("Area of
Rectangle is "+area);
    }
    case 2:
    {
        System.out.println("Enter the height
and breadth of the triangle:");
        t.x=s.nextInt();
        t.y=s.nextInt();
        area=t.printarea();
        System.out.println("Area of Triangle
is "+area);
    }
    case 3:
    {
        System.out.println("Enter the radius
of the circle:");
        c.x=s.nextInt();
        area=c.printarea();
        System.out.println("Area of Circle
is "+area);
    }
    case 4:
    {
        p=false;break;
    }
    default:
    {
        System.out.println("Invalid Input");
    }
}
}
```

```
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```

```
C:\Users\Language lab 28\Desktop\1BM22CS121>javac Sarea.java
```

```
C:\Users\Language lab 28\Desktop\1BM22CS121>java Sarea
```

```
Enter following choices to find area of shapes of your choice 1.Rectangle 2.Triangle 3.Circle 4.Exit  
1
```

```
Enter the length and breadth of the rectangle:
```

```
5 10
```

```
Area of Rectangle is 50.0
```

```
Enter following choices to find area of shapes of your choice 1.Rectangle 2.Triangle 3.Circle 4.Exit  
2
```

```
Enter the height and breadth of the triangle:
```

```
2 2
```

```
Area of Triangle is 2.0
```

```
Enter following choices to find area of shapes of your choice 1.Rectangle 2.Triangle 3.Circle 4.Exit  
3
```

```
Enter the radius of the circle:
```

```
2
```

```
Area of Circle is 12.566370614359172
```

```
Enter following choices to find area of shapes of your choice 1.Rectangle 2.Triangle 3.Circle 4.Exit  
4
```

```
C:\Users\Language lab 28\Desktop\1BM22CS121>
```

Lab 3

Page

Ques

4. Develop a Java program to create an abstract class named `Shape` that contains a integer and an empty method named `printArea()`. Provide 3 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;  
import java.lang.Math.*;  
abstract class Shape  
{  
    int x,y;  
    abstract double printArea();  
}
```

```
class Rectangle extends Shape  
{
```

```
    double printArea()  
    {
```

```
        return x*y; } }
```

class Triangle extends Shape

{
double paintArea()
{

return 0.5*x*y;

}

class Circle extends Shape

{
double paintArea()
{

return Math.PI*x*x;

}

class Sarea

{
public static void main (String XX[])

{
int x,y,ch;
double area;

boolean p=true;

Rectangle s1=new Rectangle();

Triangle t=new Triangle();

Circle c=new Circle();

Scanner s=new Scanner (System.in);
while (p==true)

{

System.out.print ("Enter following
choice to find area of shape of your
choice 1.Rectangle & Triangle 3.Circle);
ch=s.nextInt();

switch(ch)

{

case 1:

{

System.out.print ("Enter the
length and breadth of the rectangle");

s1.x=s.nextInt();

s1.y=s.nextInt();

area=s1.paintArea();

System.out.print ("Area of Rectan-
gle is "+area);

break;

{

case 2:

{

System.out.print ("Enter the
height and breadth of the tri-
angle:");

```
t.x = s.nextInt();
```

```
t.y = s.nextInt();
```

```
area = t.getArea();
```

```
System.out.println("Area of  
Triangle is " + Area);
```

```
break;
```

```
}
```

```
case 3:
```

```
{
```

```
System.out.println("Enter the  
radius of the circle:");
```

```
c.x = s.nextInt();
```

```
area = c.getArea();
```

```
System.out.println("Area of  
Circle is " + area);
```

```
break;
```

```
}
```

```
case 4:
```

```
p = false; break;
```

```
default:
```

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

```
}
```

```
{
```

```
}
```

3

Output

enter following choices to find area of
shape of your choice 1. Rectangle
2. Triangle 3. Circle

1.

Enter the length and breadth of the
rectangle:

5 10

Area of Rectangle is 50.0

Enter following choices to find area
of shape of your choice 1. Rectangle
2. Triangle 3. Circle

2

Enter the height and breadth of the
triangle

2 2

Area of Triangle is 2.0

enter following choices to find area of
shape of your choice 1. Rectangle 2. Triangle
3. Circle

3

Enter the radius of the circle:

2

~~Area of circle is 12.566370814959172.
Enter following choices to find area
of shapes of your choice 1. Rectangle
2. Triangle 3. Circle. A to exit~~

4

8,12m

31'

```
class Account {  
protected String customerName;  
protected String accountNumber;  
protected double balance;  
public Account(String customerName, String accountNumber) {  
this.customerName = customerName;  
this.accountNumber = accountNumber;  
this.balance = 0;  
}  
public void deposit(double amount) {  
balance += amount;  
System.out.println("Deposit of $" + amount + " successful");  
}  
public void displayBalance() {  
System.out.println("Account Number: " + accountNumber + "\nBalance: " + balance);  
}  
}  
class SavingsAccount extends Account {  
public SavingsAccount(String customerName, String accountNumber) {  
super(customerName, accountNumber);  
}  
public void computeInterest() {  
double interestRate = 0.05;  
double interest = balance * interestRate;  
balance += interest;  
System.out.println("Interest of $" + interest + " computed and added to the  
balance.");  
}  
public void withdraw(double amount) {  
if (balance >= amount) {  
balance -= amount;  
System.out.println("Withdrawal of " + amount + " successful");  
} else {  
System.out.println("Insufficient funds for withdrawal.");  
}  
}  
}  
}  
class CurrentAccount extends Account {  
private double minimumBalance = 1000;  
public CurrentAccount(String customerName, String accountNumber) {  
super(customerName, accountNumber);  
}  
public void withdraw(double amount) {  
if (balance - amount >= minimumBalance) {  
balance -= amount;  
System.out.println("Withdrawal of " + amount + " successful.");  
} else {  
System.out.println("Insufficient funds. Service charge applied.");  
}  
}
```

```
imposeServiceCharge();
}
}
}
private void imposeServiceCharge() {
double serviceCharge = 20;
balance -= serviceCharge;
System.out.println("Service charge of $" + serviceCharge + " imposed.");
}
}
class Bank {
public static void main(String XX[]) {
SavingsAccount savingsAccount = new SavingsAccount("John Doe", "SA1001");
CurrentAccount currentAccount = new CurrentAccount("Jane Smith", "CA2002");
savingsAccount.deposit(5000);
savingsAccount.displayBalance();
savingsAccount.computeInterest();
savingsAccount.displayBalance();
savingsAccount.withdraw(2000);
savingsAccount.displayBalance();
currentAccount.deposit(8000);
currentAccount.displayBalance();

currentAccount.withdraw(5000);
currentAccount.displayBalance();
}
}
}
```

Microsoft Windows [Version 10.0.19044.3086]
(c) Microsoft Corporation. All rights reserved.

C:\Users\Language lab 28\Desktop\Bank>javac Bank.java

C:\Users\Language lab 28\Desktop\Bank>java Bank
Deposit of \$5000.0 successful
Account Number: SA1001
Balance: 5000.0
Interest of \$250.0 computed and added to the balance.

Account Number: SA1001
Balance: 5250.0

Withdrawal of 2000.0 successful
Account Number: SA1001

Balance: 3250.0
Deposit of \$8000.0 successful

Account Number: CA2002
Balance: 8000.0
Withdrawal of 5000.0 successful.
Account Number: CA2002
Balance: 3000.0

C:\Users\Language lab 28\Desktop\Bank>

5.

Create a class Bank that maintains two kinds of account for the 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 min. 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 Curr-acct and Sav-acct to make them more specific to their requirement. 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 the deposit interest

- d) Permit withdrawal and update the balance.

```

class Bank {
public static void main(String[] args) {
    SavingsAccount savings
    class Account {
protected String customerName;
protected String accountNumber;
protected double balance;
public Account(String customerName,
               String accountNumber) {
    this.customerName = customerName;
    this.accountNumber = accountNumber;
    this.balance = 0;
}
public void deposit(double amount) {
    balance += amount;
    System.out.println("Deposit of $" + amount +
                       " successful");
}
public void displayBalance() {
    System.out.println("Account Number " +
                       accountNumber + "\nBalance: " + balance);
}
}

```

class CurrentAccount extends Account
private double minimumBalance = 1000;
public CurrentAccount (String customerName, String accountNumber)
super (customerName, accountNumber);

public void withdraw (double amount)
{ if (balance - amount) > minimumBalance
{ balance -= amount;
System.out.println ("Withdrawal of
" + amount + " successful.");
}
else {
System.out.println ("Insufficient
funds. Service charge applied.");
imposeServiceCharge();
}

private void imposeServiceCharge()
double serviceCharge = 0;
balance -= serviceCharge;
System.out.println ("Service charge
of \$ " + serviceCharge + " imposed.");

class Bank {
public static void main (String args) {
SavingsAccount savingsAccount = new
SavingsAccount ("Ramy", "SA1001");
CurrentAccount currentAccount = new
CurrentAccount ("Radha", "CA2002");
savingsAccount.deposit(5000);
savingsAccount.displayBalance();
savingsAccount.computeInterest();
savingsAccount.displayBalance();
savingsAccount.withdraw(2000);
savingsAccount.displayBalance();
currentAccount.deposit(8000);
currentAccount.displayBalance();
currentAccount.withdraw(5000);
currentAccount.displayBalance();
}

Output:
Deposit of \$5000.0 successful
Account Number: SA1001
Balance: 5000.0
Interest of \$50.0 computed and added to
the balance.

Account Number: SA1001

Balance: 5050.0

withdrawal of 2000.0 successful

account number: SA1001

Balance: 3050.0

Deposit of \$8000.0 successful

account number: CA2002

Balance: 8000.0

withdrawal of 5000.0 successful.

account number: CA2002

Balance: 3000.0

5/2/21
105/2/21

```
package CIE;
public class Student
{
    public int usn,sem; public String name;
    public Student(){}
    public Student(String name,int usn,int sem){
        this.name=name;this.usn=usn;this.sem=sem;
    }
}
```

```
package CIE;
public class Internals extends Student
{
    public int imarks[]=new int[5];
    public Internals(){}
    public Internals(String name,int usn,int sem)
    {
        super(name,usn,sem);
    }
}
```

```
package SEE;
public class External extends CIE.Student
{
    public int emarks[] = new int[5];
}
```

```

import java.util.Scanner;
class Student
{
    int n,m,grade,tot=0;
    float sum=0.0,sgpa;
    String usn[]=new String[25];
    float mark[]=new float[25];
    int credit[]=new int[25];
    String name[]=new String[25];
    Scanner s=new Scanner(System.in);
    void accept()
    {
        System.out.println("Enter the number of students:");
        n=s.nextInt();
        for(int i=0;i<n;i++)
        {
            System.out.println("Enter the name and usn of the student");
            name[i]=s.next();
            usn[i]=s.next();
            System.out.println("Enter the number of subjects:");
            m=s.nextInt();
            System.out.println("Enter the marks and credits of every
subject:");
            for(int j=0;j<m;j++)
            {
                System.out.println((j+1)+"."+"Marks=");
                mark[j]=s.nextFloat();
                System.out.println("Credits=");
                credit[j]=s.nextInt();
            }
        }
    }
    void display()
    {
        System.out.println("Details of Students:");
        for(int i=0;i<n;i++)
        {
            System.out.println("NAME:"+name[i]+" USN"+usn[i]);
            for(int j=0;j<m;j++)
            {
                System.out.println((j+1)+"."+"MARKS="+mark[j]+"
CREDITS="+credit[j]);
            }
            calc();
        }
    }
    void calc()
    {
        for(int j=0;j<m;j++)
        {

```

```

        if(mark[j]>=90)
        {
            grade=10;
        }
        else if(mark[j]>=80&&mark[j]<90)
        {
            grade=9;
        }
        else if(mark[j]>=70&&mark[j]<80)
        {
            grade=8;
        }
        else if(mark[j]>=60&&mark[j]<70)
        {
            grade=7;
        }
        else if(mark[j]>=50&&mark[j]<60)
        {
            grade=6;
        }
        else if(mark[j]>=40&&mark[j]<50)
        {
            grade=5;
        }
        else
        {
            grade=0;
        }
        tot=tot+credit[j];
        sum=sum+(grade*credit[j]);
    }
    sgpa=sum/tot;
    System.out.println("SGPA of Student:"+sgpa);
}
}
class Main
{
    public static void main(String SS[])
    {
        Student t=new Student();
        t.accept();
        t.display();
    }
}

```

Lab4

Date _____
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6. Create a package CSE which has two class → Student and Internals . The class student has members like idn, name , sem. The class Internals has an array that stores the internal marks, scored in five courses of the current sem. Create another package SEE which is a derived class of Student . This class has an array that stores the SEE marks stored 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

Student.java

package CSE;

public class Student

{

 public int idn, sem; public String name;

 public Student() { }

 public Student (String name, int idn,
 int sem)

{

 this.name = name; this.idn = idn;

 this.sem = sem;

}

{

Internal.java

```
package CSE;
public class Internal extends Student
{
    public int marks[] = new int[5];
    public Internal()
    {
        public Internal(String name, int cn, int sem)
        {
            super(name, cn, sem);
        }
    }
}
```

External.java

```
package SEE;
public class External extends Student
{
    public int marks[] = new int[5];
}
```

Main.java

```
import java.util.Scanner;
import CSE.Student;
import CSE.Internal;
import SEE.External;
```

class Main

```
{  
    public static void main(String args[])
    {  
        Scanner s = new Scanner(System.in);  
        String name; int cn, sem;  
        System.out.println("Enter the number of  
        students :");  
        int n = s.nextInt();  
        Internal pn[] = new Internal[n];  
        External ex[] = new External[n];  
        for (int i = 0; i < n; i++)  
        {  
            System.out.println("Enter the name  
            of the student " + (i + 1) + ":");  
            name = s.next();  
            System.out.println("Enter cn of the  
            student " + (i + 1) + ":");  
            cn = s.nextInt();  
            System.out.println("Enter the sem  
            of the student " + (i + 1) + ":");  
            sem = s.nextInt();  
            pn[i] = new Internal(name, cn, sem);  
            ex[i] = new External();  
            System.out.println("Enter the  
            internal marks of the 5 subjects:");  
        }  
    }  
}
```

```

for(int j=0; j<5; j++)
{
    m[i].marks[j] = s.nextInt();
}
System.out.println("Enter the internal marks  
of the student in 5 subjects:");
for(int j=0; j<5; j++)
{
    ex[i].marks[j] = s.nextInt();
}
for(int p=0; p<n; p++)
{
    System.out.println("In details of student  
" + (i+1) + ":");
    System.out.println("Name : " + name[i]);
    System.out.println("USN : " + rn[i].usn);
    System.out.println("Internal marks : ");
    for(int j=0; j<5; j++)
    {
        System.out.println("Subject " + (j+1) + ":" + m[i].marks[j] + "\t");
    }
}

```

```

System.out.println("External marks : ");
for(int j=0; j<5; j++)
{
    System.out.println("Subject " + (j+1) +
                       ":" + ex[i].marks[j] + "\t");
}
System.out.println("Total marks : ");
for(int j=0; j<5; j++)
{
    System.out.println("Subject " + (j+1) +
                       ":" + (m[i].marks[j] + ex[i].marks[j]) +
                       "\t");
}

```

Output:
Enter the number of students:

0.
Enter the name of the student :

Siri
Enter the usn of the student :

Q35
Enter the sem of the student :

3

Enter the internal marks of the student in
5 subjects:

33 45 48 46 435

Enter the external marks of the student in
5 subjects:

50 45 44 39 40 26

Enter the name of the student 1:

Kushal

Enter USN of the student 1:

1659

Enter the sem of the student 1:

3.

Enter the internal marks of the student in
5 subjects:

36 45 40 28 33

Enter the External marks of the student,
5 subjects:

46 50 18 46 39.

Details of student 1:

Name: Siri USN: 225 Sem: 3

Internal marks:

Subject 1: 28 Subject 2: 45 Subject 3: 48

Subject 4: 46 Subject 5: 35

External marks:

Subject 1: 45 Subject 2: 44 Subject 3: 439

Page 1
Subject 4: 40 Subject 5: 26

Final marks:

Subject 1: 58

Subject 2: 90 89

Subject 3: 90 87

Subject 4: 86

Subject 5: 61

Details of student 2:

Name: Kushal USN: 1659 Sem: 3

Internal marks:

Subject 1: 36 Subject 2: 45 Subject 3: 42

Subject 4: 28 Subject 5: 33

External marks:

Subject 1: 46 Subject 2: 50 Subject 3: 18

Subject 4: 46 Subject 5: 39

Final marks:

Subject 1: 82

Subject 2: 95

Subject 3: 60

Subject 4: 74

Subject 5: 72

```

import java.util.Scanner;
class WrongAge extends Exception
{
    public WrongAge(string error)
    {
        System.out.println(error);
    }
}
class Father
{
    int age;
    Father(int age) throws WrongAge
    {
        if(age<0)
        {
            throw new WrongAge("Father's age cannot be negative");
            this.age=age;
        }
    }
    class Son extends Father
    {
        int age;
        Son(int age,int s_age) throws WrongAge
        {
            super(age);
            if(s_age>=age)
                throw new WrongAge("Son's age cannot be greater than
Father's age");
                this.age=age;
        }
    }
}
class Main
{
    public static void main(String args[])
    {
        Scanner s=new Scanner(System.in);
        try{
            System.out.println("Enter Father's age:");
            int f_age=s.nextInt();
            int s_age=s.nextInt();
            Son a=new Son(f_age,s_age);
            System.out.println("Father's age:"+f_age);
            System.out.println("Son's age:"+s_age);
        }
        catch(WrongAge e)
        {
            System.out.println("Wrong Age entered");
        }
        catch(Exception ee)
        {

```

```
        System.out.println("Unexpected error"+ee);
    }
}
```

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 throw the exception WrongAge() when the input age < 0. In Son class, implement a constructor that takes both father and son's age and throw an exception if son's age is greater than father's age.

```
import java.util.Scanner;
class WrongAge extends Exception {
    public WrongAge (String error) {
        System.out.println(error);
    }
}
```

```
class Father {
    int age;
    Father (int age) throws WrongAge {
        if (age < 0)
            throw new WrongAge ("Father's age cannot be negative");
        this.age = age;
    }
}
```

class Son extends Father

int age

Son (int age, int x-age) throws WrongAge

{ super (age);

if (x-age) >= age

throw new WrongAge ("Son's age cannot be greater than Father's age");
this.age = age;

class Main

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

Scanner a = new Scanner (System.in)

{ try

System.out.print ("Enter Father's age: ");

int f-age = a.nextInt();

int x-age = a.nextInt();

Son a = new Son (f-age, x-age);

System.out.print ("Father's age: " + f-age);

System.out.print ("Son's age: " + x-age);

catch (WrongAge e)

{ System.out.println ("Wrong age entered"); }

catch (Exception ee)

{ System.out.println ("Unexpected error");
ee); }

}

}

Output:

1. Enter Father's age: 2. Enter Father's age:

45

-2

Enter Son's age:

Enter Son's age

15

8

Father's age: 45

Father's age cannot be

Son's age: 15

negative

Wrong age entered

3. Enter Father's age:

4. Enter Father's age:

9

38.9

Enter Son's age:

unexpected error, java

20

util. InputMismatch

Son's age cannot be

Exception

greater than Father's age

Wrong age entered

9/1/20
gallar

```
import java.util.Scanner;
import java.lang.*;
class DisplayMessage extends Thread
{
    String mess;
    int delay;
    public DisplayMessage(String mess,int delay)
    {
        this.mess=mess;
        this.delay=delay;
    }
    public void run()
    {
        while(true){
            System.out.println(mess);
            try{
                Thread.sleep(delay*1000);
            }
            catch(InterruptedException e){
                e.printStackTrace();
            }
        }
    }
}
public class ThreadsMain{
    public static void main(String XX[])
    {
        DisplayMessage thread1=new DisplayMessage("BMS College of
Engineering",10);
        DisplayMessage thread2=new DisplayMessage("CSE",2);
        thread1.start();
        thread2.start();
    }
}
```

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.

```
import java.util.Scanner;  
import java.lang.*;  
class DisplayMessage extends Thread {  
    String mess;  
    int delay;  
    public DisplayMessage (String mess, int delay) {  
        this.mess = mess;  
        this.delay = delay;  
    }  
    public void run() {  
        for (int i=0; i<3; i++) {  
            System.out.println(mess);  
            try {  
                Thread.sleep(delay * 1000);  
            } catch (InterruptedException e) {  
                e.printStackTrace();  
            }  
        }  
    }  
}
```

public class ThreadMain

public static void main (String[] args)

DisplayMessage thread1 = new

DisplayMessage ("BMS College
Engineering", 10);

DisplayMessage thread2 = new

DisplayMessage ("CSE", 10);

thread1.start();

thread2.start();

}

Output:

BMS College of Engineering

CSE

CSE

CSE

BMS College of Engineering

BMS College of Engineering