

PRACTICE QUESTIONS - LAB 4

2,8 (*)

7(**)

1.

```
class Figure{
    int a; int b;
    Figure(int a, int b){
        this.a=a;
        this.b=b;
    }
    double area(){
        return 0;
    }
}
class Rectangle extends Figure{
    Rectangle(int a, int b){
        super(a,b);
    }
    double area(){
        return a*b;
    }
}
class Triangle extends Figure{
    Triangle(int a, int b){
        super(a,b);
    }
    double area(){
        return (0.5)*a*b;
    }
}
class Main{
    public static void main(String args[]){
        Rectangle r=new Rectangle(2,3);
        Triangle t=new Triangle(1,2);
        Figure f=new Rectangle(2,2);
        System.out.println("Area of Rectangle:"+r.area());
        System.out.println("Area of Triangle:"+t.area()+"\n");
        System.out.println(f.area());
    }
}
```

OUTPUT:

Area of Rectangle:6.0

Area of Triangle:1.0

4.0

2.

```
import java.util.Scanner;

class Student {
    int USN;
    String Name;
    int[] Marks = new int[3];

    Student(int USN, String Name, int[] Marks) {
        this.USN = USN;
        this.Name = Name;
        this.Marks = Marks;
    }

    void displayDetails() {
        System.out.println("USN: " + USN);
        System.out.println("Name: " + Name);
        System.out.println("Average marks: " + average());
    }

    double average() {
        int[] sortedMarks = Marks.clone();
        java.util.Arrays.sort(sortedMarks);

        // Calculate the average of the 2 better marks
        return (sortedMarks[1] + sortedMarks[2]) / 2.0;
    }
}

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

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

```

        System.out.println("Enter the USN:");
        int USN = scanner.nextInt();
        System.out.println("Enter the Name:");
        String Name = scanner.next();
        System.out.println("Enter marks of 3 tests of a subject:");
        int[] Marks = new int[3];
        for (int j = 0; j < 3; j++) {
            Marks[j] = scanner.nextInt();
        }
        students[i] = new Student(USN, Name, Marks);
    }

    System.out.println("\nDetails of Students:");
    for (Student student : students) {
        student.displayDetails();
    }
}
}

```

OUTPUT:

```

Enter the number of students:
2
Enter the USN:
238
Enter the Name:
sanjana
Enter marks of 3 tests of a subject:
40 37 27
Enter the USN:
233
Enter the Name:abc
Enter marks of 3 tests of a subject:
40 39 38
Details of Students:
USN: 238
Name: sanjana
Average marks: 38.5
USN: 233
Name: abc
Average marks: 39.5

```

3.

```

class TIME{
    int hour; int min; int sec;
    TIME(int h, int m, int s){
        hour=h;
        min=m;
        sec=s;
    }
    void advance(){

        if(min==59){
            hour++;
            min=0;
        }
        else{
            min++;
        }
        if(sec==59){
            sec=0;
        }
        else{
            sec++;
        }
    }
    void print(){
        System.out.println("time- hour: minutes: seconds: "+hour+"."+min+"."+sec);
    }
}

class Main{
    public static void main(String args[]){
        TIME t=new TIME(5,59,59);
        TIME t1=new TIME(3,35,30);
        t.advance();
        t.print();
        t1.advance();
        t1.print();
    }
}

```

OUTPUT:

```

time- hour: minutes: seconds: 6:0:0
time- hour: minutes: seconds: 3:36:31

```

4.

```
class MATRIX{
    int a; int b; int c; int d;
    MATRIX(){
        a=1;
        b=2;
        c=3;
        d=4;
    }
    void inverse() {
        int determinant =(a * d - b * c);
        if (determinant != 0) {
            int temp = a;
            a = d / determinant;
            b = -b / determinant;
            c = -c / determinant;
            d = temp / determinant;
            System.out.println("Elements of inverse matrix: " + a + " " + b + " " + c + " " + d);
        } else {
            System.out.println("Inverse matrix does not exist.");
        }
    }
    int determinant(){
        return (a*d-b*c);
    }
    Boolean isSingular(){
        if((a*d-b*c)==0){
            return true;
        }
        else{
            return false;
        }
    }
    void print(){
        System.out.println("elements of the matrix are: "+a+" "+b+" "+c+" "+d);
    }
}
```

```

}
class Main{
    public static void main(String args[]){
        MATRIX m=new MATRIX();
        m.inverse();
        System.out.println("Determinant value= "+m.determinant());
        System.out.println("Singular matrix? "+m.isSingular());
        m.print();
    }
}

```

OUTPUT:

Elements of inverse matrix: -2 1 1 0
 Determinant value= -1
 Singular matrix? false
 elements of the matrix are: -2 1 1 0

5.

```

class EMP{
    int empno; String empname; int sal;
    EMP(int empno, String empname, int sal){
        this.empno=empno;
        this.empname=empname;
        this.sal=sal;
    }
    void max(EMP em){
        if(this.sal>em.sal){
            System.out.println("Max salary is"+ this.sal+" Employee name:"+this.empname);
        }
        else{
            System.out.println("Max salary is"+ em.sal+" Employee name:"+em.empname);
        }
    }
}
class Main{
    public static void main(String args[]){
        EMP e=new EMP(1,"ram",20000);
        EMP e1=new EMP(2,"raju",50000);
        e.max(e1);
    }
}

```

OUTPUT:

Max salary is50000. Employee name:raju

6.

```
import java.util.Scanner;

class Student{
    int usn; float cmarks; float smarks;
    Student(int usn, float cmarks, float smarks){
        this.usn=usn;
        this.cmarks=cmarks;
        this.smarks=smarks;
    }
    void display(){
        float total=cmarks+smarks;
        if(total>=75){
            System.out.println("Grade: S for USN:"+this.usn);
        }
        else if(total>=60 && total<=74){
            System.out.println("Grade: A for USN:"+this.usn);
        }
        else if(total>=40 && total<=59){
            System.out.println("Grade: B for USN:"+this.usn);
        }
        else if(total<40){
            System.out.println("Grade: F for USN:"+this.usn);
        }
    }
}

class Main{
    public static void main(String args[]){
        Scanner s=new Scanner(System.in);
        System.out.println("enter usn");
        int usn=s.nextInt();
        System.out.println("enter cmarks");
        int cmarks=s.nextInt();
        System.out.println("enter smarks");
        int smarks=s.nextInt();
        if(cmarks<=50 && smarks<=50){
            Student s1=new Student(usn, cmarks, smarks);
        }
    }
}
```

```

        s1.display();
    }
    else{
        System.out.println("invalid marks entered");
    }
}
}

```

OUTPUT:

A.

```

enter usn
238
enter cmarks
49
enter smarks
50
Grade: S for USN:238

```

B.

```

enter usn
010
enter cmarks
51
enter smarks
34
invalid marks entered

```

7.

```

abstract class Student{
    String Name; int Regno; int age;
    Student(String n, int r, int a){
        Name=n;
        Regno=r;
        age=a;
    }
}
class UG_Student extends Student{
    int sem; int fees; int stipend;
    UG_Student(String n, int r, int a, int sem, int fees, int stipend){
        super(n,r,a);
    }
}

```



```

        this.sem=sem;
        this.fees=fees;
        this.stipend=stipend;
    }
    static void avgAge(UG_Student u1, UG_Student u2, UG_Student u3, UG_Student u4,
UG_Student u5){
        int avg;
        avg=(u1.age+u2.age+u3.age+u4.age+u5.age)/5;
        System.out.println("average age of UG Students:"+avg+"\n");
    }
}
class PG_Student extends Student{
    int sem; int fees; int stipend;
    PG_Student(String n, int r, int a, int sem, int fees, int stipend){
        super(n,r,a);
        this.sem=sem;
        this.fees=fees;
        this.stipend=stipend;
    }
    static void avgAge(PG_Student p1,PG_Student p2,PG_Student p3,PG_Student
p4,PG_Student p5){
        int avg;
        avg=(p1.age+p2.age+p3.age+p4.age+p5.age)/5;
        System.out.println("average age of PG Students:"+avg);
    }
}
class Main{
    public static void main(String args[]){
        UG_Student u1=new UG_Student("Sanjana",1,19,3,2000,30000);
        UG_Student u2=new UG_Student("Sam",2,20,3,3000,30000);
        UG_Student u3=new UG_Student("Alex",3,21,5,5000,60000);
        UG_Student u4=new UG_Student("Ahem",4,22,5,2000,30000);
        UG_Student u5=new UG_Student("Ria",5,20,4,6000,30000);
        PG_Student p1=new PG_Student("Abhay",6,23,1,2000,30000);
        PG_Student p2=new PG_Student("Sonica",7,25,3,5000,80000);
        PG_Student p3=new PG_Student("Samay",8,23,2,2000,30000);
        PG_Student p4=new PG_Student("Shriya",9,26,4,5000,90000);
        PG_Student p5=new PG_Student("Ravi",10,24,3,2000,30000);
        UG_Student.avgAge(u1,u2,u3,u4,u5);
        PG_Student.avgAge(p1,p2,p3,p4,p5);
    }
}

```

OUTPUT:

average age of UG Students:20
average age of PG Students:24

8.

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

```
class Person {  
    String name;  
    String dob;  
    String address;
```

```
    Person(){
```

```
}
```

```
    Person(String name, String dob, String address) {  
        this.name = name;  
        this.dob = dob;  
        this.address = address;  
    }
```

```
    void inputPersonData() {  
        Scanner scanner = new Scanner(System.in);  
        System.out.print("Enter Name: ");  
        name = scanner.nextLine();  
        System.out.print("Enter Date of Birth: ");  
        dob = scanner.nextLine();  
        System.out.print("Enter Address: ");  
        address = scanner.nextLine();  
    }
```

```
    void displayPersonInfo() {  
        System.out.println("Name: " + name);  
        System.out.println("Date of Birth: " + dob);  
        System.out.println("Address: " + address);  
    }  
}
```

```
class Student extends Person {  
    String rollno;
```

```

int sem;

Student(){

}

Student(String name, String dob, String address, String rollno, int sem) {
    super(name, dob, address);
    this.rollno = rollno;
    this.sem = sem;
}

void inputStudentData() {
    super.inputPersonData();
    Scanner scanner = new Scanner(System.in);
    System.out.print("Enter Roll Number: ");
    rollno = scanner.nextLine();
    System.out.print("Enter Semester: ");
    sem = scanner.nextInt();
}

void displayStudentInfo() {
    super.displayPersonInfo();
    System.out.println("Roll Number: " + rollno);
    System.out.println("Semester: " + sem);
}
}

class Exam extends Student {
    int marks1;
    int marks2;

    Exam(){

    }

    Exam(String name, String dob, String address, String rollno, int sem, int marks1, int
marks2) {
        super(name, dob, address, rollno, sem);
        this.marks1 = marks1;
        this.marks2 = marks2;
    }

    void inputExamData() {

```

```

        super.inputStudentData();
        Scanner scanner = new Scanner(System.in);
        System.out.print("Enter Marks 1: ");
        marks1 = scanner.nextInt();
        System.out.print("Enter Marks 2: ");
        marks2 = scanner.nextInt();
    }

    double calculateAverage() {
        return (marks1 + marks2) / 2.0;
    }

    void displayExamInfo() {
        super.displayStudentInfo();
        System.out.println("Marks 1: " + marks1);
        System.out.println("Marks 2: " + marks2);
        System.out.println("Average Marks: " + calculateAverage());
    }
}

class Main {
    public static void main(String[] args) {
        Exam student1 = new Exam();
        Exam student2 = new Exam();

        // Input data for both students
        System.out.println("Enter details for Student 1:");
        student1.inputExamData();
        System.out.println("\nEnter details for Student 2:");
        student2.inputExamData();

        // Display information for both students
        System.out.println("\nDetails for Student 1:");
        student1.displayExamInfo();
        System.out.println("\nDetails for Student 2:");
        student2.displayExamInfo();

        // Determine and display the topper
        if (student1.calculateAverage() > student2.calculateAverage()) {
            System.out.println("\nStudent 1 is the topper!");
        } else if (student1.calculateAverage() < student2.calculateAverage()) {
            System.out.println("\nStudent 2 is the topper!");
        } else {
            System.out.println("\nBoth students have the same average marks.");
        }
    }
}

```

```
}  
}  
}
```

OUTPUT:

Enter details for Student 1:Enter Name: Sanjana

Enter Date of Birth: 23.04.2004

Enter Address: Brigade Meadows

Enter Roll Number: 238

Enter Semester: 3

Enter Marks 1: 37

Enter Marks 2: 40

Enter details for Student 2:

Enter Name: Rhea

Enter Date of Birth: 7.08.2004

Enter Address: Falcon City

Enter Roll Number: 230

Enter Semester: 3

Enter Marks 1: 40

Enter Marks 2: 40

Details for Student 1:

Name: SanjanaDate of Birth: 23.04.2004Address: Brigade MeadowsRoll Number:
238Semester: 3Marks 1: 37Marks 2: 40Average Marks: 38.5

Details for Student 2:

Name: Rhea

Date of Birth: 7.08.2004

Address: Falcon City

Roll Number: 230

Semester: 3

Marks 1: 40

Marks 2: 40

Average Marks: 40.0

Student 2 is the topper!