Cycle - 1

1) Define a class 'product' with data members pcode, pname and price. Create 3 objects of the class and find the product having the lowest price.
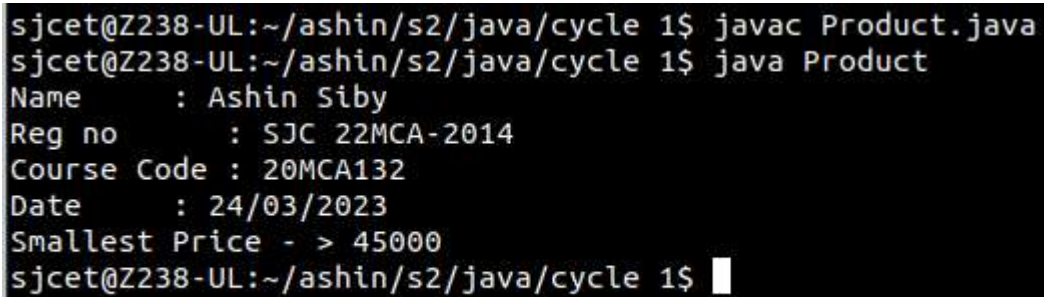
Code:

```
public class product
{
int pcode;
int price;
String pname;
void getdata(int p1,String p2,int p3)
{
pcode = p1;
pname = p2;
price = p3;
}
public static void main(String[]args)
{
System.out.println("Name : APARNA MOHAN");
System.out.println("Reg no : SJC 22MCA-2013");
System.out.println("Course code : 20MCA132");
System.out.println("Date : 24/3/2023");
int smallest;
product ob1 = new product();
product ob2 = new product();
product ob3 = new product();
ob1.getdata(3243,"Dell inspiron",57000);
ob2.getdata(3654,"Lenova",33000);
ob3.getdata(3875,"asus",90000);
if(ob1.price<ob2.price){
if(ob3.price<ob1.price)
{
smallest = ob3.price;
}
else
{
smallest = ob1.price;
}
}
else
{
```

```
if (ob2.price<ob3.price)
{
smallest = ob2.price;
}
else
{
smallest = ob3.price;
}
}
System.out.println(smallest+"is the cheapest.");
}
}
```
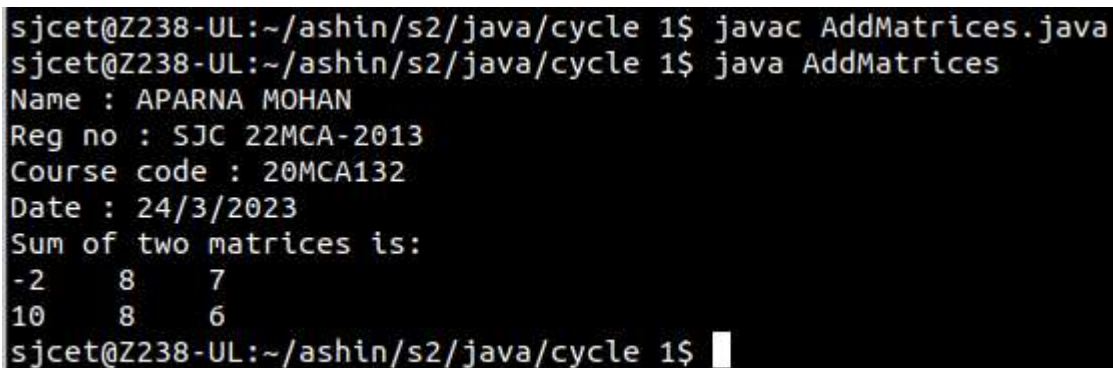
Output

```
sjcet@Z238-UL:~/ashin/s2/java/cycle 1$ javac Product.java
sjcet@Z238-UL:~/ashin/s2/java/cycle 1$ java Product
Name      : Ashin Siby
Reg no       : SJC 22MCA-2014
Course Code : 20MCA132
Date      : 24/03/2023
Smallest Price - > 45000
sjcet@Z238-UL:~/ashin/s2/java/cycle 1$ ▉
```

2) Read 2 matrices from the console and perform matrix addition.

Code:

```
public class AddMatrices {
public static void main(String[] args) {
System.out.println("Name : APARNA MOHAN");
System.out.println("Reg no : SJC 22MCA-2013");
System.out.println("Course code : 20MCA132");
System.out.println("Date : 24/3/2023");
int rows = 2, columns = 3;
int[][] firstMatrix = { {2, 3, 4}, {5, 2, 3} };
int[][] secondMatrix = { {-4, 5, 3}, {5, 6, 3} };
// Adding Two matrices
int[][] sum = new int[rows][columns];
for(int i = 0; i < rows; i++) {
for (int j = 0; j < columns; j++) {
sum[i][j] = firstMatrix[i][j] + secondMatrix[i][j];
}
}
// Displaying the result
System.out.println("Sum of two matrices is: ");
for(int[] row : sum) {
for (int column : row) {
System.out.print(column + " ");
}
System.out.println();
}
}
}
```

Output

```
sjcet@Z238-UL:~/ashin/s2/java/cycle 1$ javac AddMatrices.java
sjcet@Z238-UL:~/ashin/s2/java/cycle 1$ java AddMatrices
Name : APARNA MOHAN
Reg no : SJC 22MCA-2013
Course code : 20MCA132
Date : 24/3/2023
Sum of two matrices is:
-2    8    7
10    8    6
sjcet@Z238-UL:~/ashin/s2/java/cycle 1$
```

3) Add complex numbers

Code:

```java
import java.util.Scanner;
public class ComplexAddition {
public static void main(String[] args) {
Scanner input = new Scanner(System.in);
System.out.print("Enter the real part of the first complex number: ");
double real1 = input.nextDouble();
System.out.print("Enter the imaginary part of the first complex
number: ");
double imaginary1 = input.nextDouble();
System.out.print("Enter the real part of the second complex number:
");
double real2 = input.nextDouble();
System.out.print("Enter the imaginary part of the second complex
number: ");
double imaginary2 = input.nextDouble();
double realResult = real1 + real2;
double imaginaryResult = imaginary1 + imaginary2;
System.out.println("Name : APARNA MOHAN");
System.out.println("Reg no : SJC 22MCA-2013");
System.out.println("Course code : 20MCA132");
System.out.println("Date : 24/3/2023");
System.out.println("The sum of the two complex numbers is: " +
realResult + " + " + imaginaryResult + "i");
}
}
```

Output

```
sjcet@Z238-UL:~/ashin/s2/java/cycle 1$ javac ComplexAddition.java
sjcet@Z238-UL:~/ashin/s2/java/cycle 1$ java ComplexAddition
Enter the real part of the first complex number: 3
Enter the imaginary part of the first complex number: 4
Enter the real part of the second complex number: 3
Enter the imaginary part of the second complex number: 4
Name : ASHIN SIBY
Reg no : SJC 22MCA-2014
Course code : 20MCA132
Date : 27/3/2023
The sum of the two complex numbers is: 6.0 + 8.0i
sjcet@Z238-UL:~/ashin/s2/java/cycle 1$
```
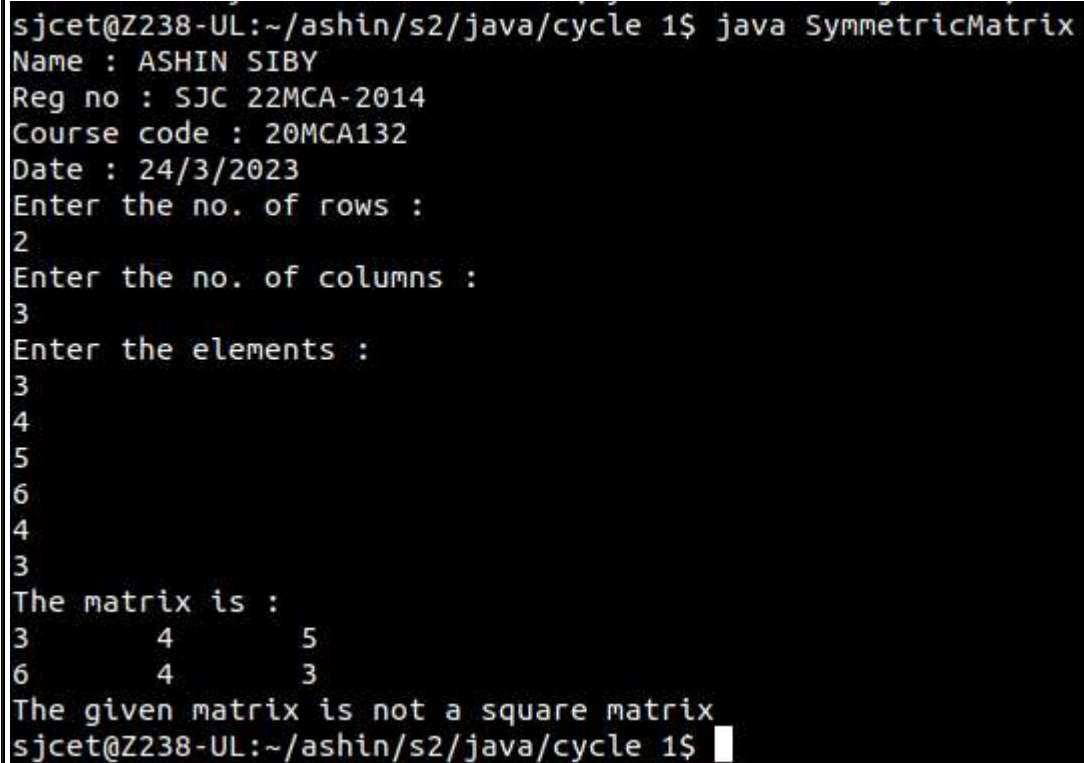
4) Read a matrix from the console and check whether it is symmetric or not.

Code:

```java
import java.util.Scanner;
public class SymmetricMatrix
{
public static void main(String[] args)
{
System.out.println("Name : APARNA MOHAN");
System.out.println("Reg no : SJC 22MCA-2013");
System.out.println("Course code : 20MCA132");
System.out.println("Date : 24/3/2023");
Scanner mat = new Scanner(System.in);
System.out.println("Enter the no. of rows : ");
int rows = mat.nextInt();
System.out.println("Enter the no. of columns : ");
int cols = mat.nextInt();
int matrix[][] = new int[rows][cols];
System.out.println("Enter the elements :");
for (int i = 0; i < rows; i++)
{
for (int j = 0; j < cols; j++)
{
matrix[i][j] = mat.nextInt();
}
}
System.out.println("The matrix is :");
for (int i = 0; i < rows; i++)
{for (int j = 0; j < cols; j++)
{
System.out.print(matrix[i][j]+"\t");
}
System.out.println();
}
if(rows != cols)
{
System.out.println("The given matrix is not a square matrix");
}
else
{
boolean symmetric = true;
for (int i = 0; i < rows; i++)
{
for (int j = 0; j < cols; j++)
{
```

```
if(matrix[i][j] != matrix[j][i])
{
symmetric = false;
break;
}
}
}
if(symmetric)
{
System.out.println("The given matrix is symmetric.");
}
else
{
System.out.println("The given matrix is not symmetric.");
}
}
mat.close();}
}
```

Output

```
sjcet@Z238-UL:~/ashin/s2/java/cycle 1$ java SymmetricMatrix
Name : ASHIN SIBY
Reg no : SJC 22MCA-2014
Course code : 20MCA132
Date : 24/3/2023
Enter the no. of rows :
2
Enter the no. of columns :
3
Enter the elements :
3
4
5
6
4
3
The matrix is :
3        4        5
6        4        3
The given matrix is not a square matrix
sjcet@Z238-UL:~/ashin/s2/java/cycle 1$
```

5) Create CPU with attribute price. Create inner class Processor (no. of cores, manufacturer) and static nested class RAM (memory, manufacturer). Create an object of CPU and print information of Processor and RAM.

Code:

```
public class cpu{
class processor{
int cores;
String producer;
processor(int noC, String manu){
cores=noC;
producer=manu;
}
void display(){
System.out.println("\nPROCESSOR DETAILS");
System.out.println("No. of Cores = "+cores);
System.out.println("Manufacturer = "+producer+"\n");
}
}
static class ram{
int mem;
String manuf;
ram(int memory,String producer ){
mem=memory;
manuf=producer;
}
void display(){
System.out.println("Name : APARNA MOHAN");
System.out.println("Reg no : SJC 22MCA-2013");
System.out.println("Course code : 20MCA132");
System.out.println("Date : 24/3/2023");
System.out.println("\nRAM DETAILS");
System.out.println("Memory = "+mem+" GB");
System.out.println("Manufacturer = "+manuf+"\n");
}
}
public static void main(String[] args) {cpu.ram obj1= new cpu.ram(8,"Intel");
cpu obj2 = new cpu();
cpu.processor obj3 = obj2.new processor(8,"Samsung");
obj1.display();
obj3.display();
}}
```

Output

```
sjcet@Z238-UL:~/ashin/s2/java/cycle 1$ javac cpu.java
sjcet@Z238-UL:~/ashin/s2/java/cycle 1$ java cpu
Name : ASHIN SIBY
Reg no : SJC 22MCA-2014
Course code : 20MCA132
Date : 27/3/2023

RAM DETAILS
Memory = 8 GB
Manufacturer = Intel


PROCESSOR DETAILS
No. of Cores = 8
Manufacturer = Samsung

sjcet@Z238-UL:~/ashin/s2/java/cycle 1$
```

Cycle - 2

1) Program to Sort strings.

Code:

```
import java.util.Scanner;
import java.util.Arrays;
public class sort {
public static void main(String[] args) {
int i,j;
Scanner sc = new Scanner(System.in);
System.out.println("SANUP");
System.out.println("SJC22MCA-2048");
System.out.println("12-4-2023");
System.out.println("");
System.out.println("Enter the number of words");
int num=sc.nextInt();
String word[]=new String[num];
sc.nextLine();
for( i=0;i<num;i++){
System.out.println("\nEnter a Word\n");
word[i]=sc.nextLine();
}
for( i=0;i<num-1;i++){
for( j=i+1;j<num;j++){
if(word[i].compareTo(word[j])>0){
String temp = word[i];
word[i]=word[j];
word[j]=temp;
}
}
}
System.out.println("Sorted String using compareTo function="+Arrays.toString(word));
System.out.println(word);
}
}
```

Output

```
^Csjcet@Z238-UL:~/ashin/s2/java/cycle 2$ javac sort.java
sjcet@Z238-UL:~/ashin/s2/java/cycle 2$ java sort
ASHIN SIBY
SJC22MCA-2014
12-4-2023

Enter the number of words
2

Enter a Word

ABC

Enter a Word

ERT
Sorted Strings using compareTo function =[ABC, ERT]
[Ljava.lang.String;@677327b6
sjcet@Z238-UL:~/ashin/s2/java/cycle 2$
```

2) Search for an element in an array.

Code:

```
import java.util.Scanner;
public class search {
public static void main(String[] args) {
int i,j,x=0;
boolean state = false;
Scanner sc = new Scanner(System.in);
System.out.println("SANUP");
System.out.println("SJC22MCA-2048");
System.out.println("12-4-2023");
System.out.println("");
System.out.println("Enter the number of elemets in array");
int num=sc.nextInt();
String word[]=new String[num];
sc.nextLine();
for( i=0;i<num;i++){
System.out.println("\nEnter a Word\n");
word[i]=sc.nextLine();
}
System.out.println("Enter the element to Search");
String search = sc.nextLine();
for( i=0;i<num;i++){
if(word[i].equals(search)){
x = i;
state = true;
}
}
if(state){
System.out.println("Element found at position = "+x);
}
functionelse{
System.out.println("Element found not found");
}
}
}
```

Output

```
sjcet@Z238-UL:~/ashin/s2/java/cycle 2$ javac search.java
sjcet@Z238-UL:~/ashin/s2/java/cycle 2$ java search
ASHIN SIBY
SJC22MCA-2014
12-4-2023

Enter the number of elemets in array
3

Enter a Word

aet

Enter a Word

drt

Enter a Word

gtr
Enter the element to Search
drt
Element found at  position = 1
sjcet@Z238-UL:~/ashin/s2/java/cycle 2$
```
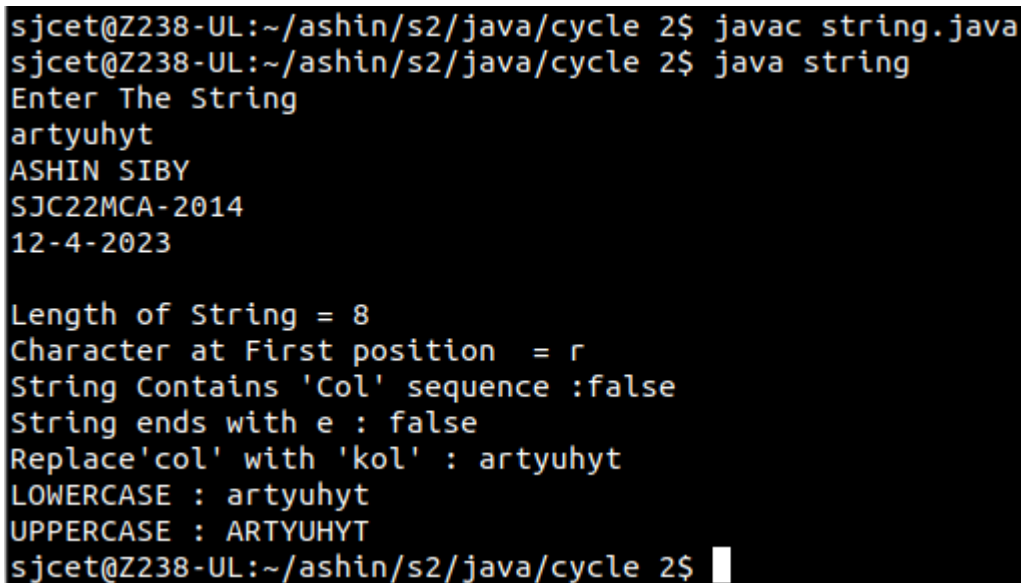
3) Perform string manipulations

Code:

```java
import java.util.Scanner;
public class string {
public static void main(String[] args) {
System.out.println("Enter The String");
Scanner sc = new Scanner(System.in);
String str1 = sc.nextLine();
System.out.println("SANUP");
System.out.println("SJC22MCA-2048");
System.out.println("12-4-2023");
System.out.println("");
System.out.println("Length of String = "+str1.length());
System.out.println("Character at First position = "+str1.charAt(1));
System.out.println("String Contains 'Col' sequence :"+str1.contains("Col"));
System.out.println("String ends with e : "+str1.endsWith("e"));
System.out.println("Replace'col' with 'kol': "+str1.replaceAll("Col","kol"));
System.out.println("LOWERCASE : "+str1.toLowerCase());
System.out.println("UPPERCASE : "+str1.toUpperCase());
}
}
```

Output

```
sjcet@Z238-UL:~/ashin/s2/java/cycle 2$ javac string.java
sjcet@Z238-UL:~/ashin/s2/java/cycle 2$ java string
Enter The String
artyuhyt
ASHIN SIBY
SJC22MCA-2014
12-4-2023

Length of String = 8
Character at First position  = r
String Contains 'Col' sequence :false
String ends with e : false
Replace'col' with 'kol' : artyuhyt
LOWERCASE : artyuhyt
UPPERCASE : ARTYUHYT
sjcet@Z238-UL:~/ashin/s2/java/cycle 2$
```

4) Program to create a class for Employee having attributes eNo, eName, eSalary. Read n employ information and Search for an employee given eNo, using the concept of Array of Objects.

Code:

```java
import java.util.Scanner;public class employee {
int eNo;
String eName;
double eSalary;
public void getdetails(){
Scanner sc = new Scanner(System.in);
System.out.println("\nEnter the Employee details");
System.out.println("Employee number : ");
eNo=sc.nextInt();
System.out.println("Name : ");
sc.nextLine();
eName=sc.nextLine();
System.out.println("Salary : ");
eSalary=sc.nextDouble();
}
void display(){
System.out.println("Empolyee No :"+eNo);
System.out.println("Name :"+eName);
System.out.println("Salary Amount"+eSalary+"\n");
}
public static void main(String[] args) {
System.out.println("SANUP");
System.out.println("SJC22MCA-2048");
System.out.println("12-4-2023");
System.out.println("");
System.out.println("\nEnter the No. of Employee's");
Scanner sc1 = new Scanner(System.in);
int num = sc1.nextInt();
employee arr[]=new employee[num];
for(int i =0;i<num;i++){
arr[i]=new employee();
arr[i].getdetails();
}
System.out.println("\nInformations of all the employee's");
for(int i=0;i<num;i++){
arr[i].display();
}
boolean state = false;System.out.println("\nEnter the Employee Number to get details of a
employee");
```

```
int num2= sc1.nextInt();
for(int i=0;i<num;i++){
if(arr[i].eNo==num2){
System.out.println("\nEmployee details");
arr[i].display();
}
}
}
}
```

Output

```
sjcet@Z238-UL:~/ashin/s2/java/cycle 2$ java employee
ASHIN SIBY
SJC22MCA-2014
12-4-2023


Enter the No. of Employee's
1

Enter the Employee details
Employee number :
2
Name :
axdsf
Salary :
4444545

Informations of all the employee's
Empolyee No :2
Name :axdsf
Salary Amount4444545.0


Enter the Employee Number to get details of a employee
2

Employee details
Empolyee No :2
Name :axdsf
Salary Amount4444545.0

sjcet@Z238-UL:~/ashin/s2/java/cycle 2$ █
```

CYCLE – 3

1) Area of different shapes using overloaded functions.

Code:

```
import java.util.Scanner;
public class area{
public static void main(String[] args){
int s,sa,l,b,ra;
Scanner sc= new Scanner(System.in);

System.out.println("Enter side of square : ");
s=sc.nextInt();
sa=Square(s);

System.out.println("Enter length, breadth of reactangle : ");
l=sc.nextInt();
b=sc.nextInt();
ra=Square(l,b);

System.out.println("Enter length,breadth,height of cuboid : ");
int cl,cb,ch,ca;
cl=sc.nextInt();
cb=sc.nextInt();
ch=sc.nextInt();
ca=Square(cl,cb,ch);

System.out.println("Ashin Siby");
System.out.println("SJC22MCA-2014");
System.out.println("07-06-2023");
System.out.println("");

System.out.println("Area of square-> "+sa);
System.out.println("Area of rectangle-> "+ra);
System.out.println("Area of cuboid-> "+ca);
}

public static int Square(int x){
int a;
a=x*x;
return a;
}
```

```
        public static int Square(int x, int y)
        {
        int a;
        a=x*y;
        return a;
        }

        public static int Square(int x,int y,int z)
        {
        int a;
        a=2*(x*y)+2*(x*z)+2*(y*z);
        return a;
        }
}
```

Output

```
sjcet@Z238-UL:~/ashin/s2/java/cycle 3$ javac area.java
sjcet@Z238-UL:~/ashin/s2/java/cycle 3$ java area
Enter side of square :
2
Enter length, breadth of reactangle :
3
4
Enter length,breadth,height of cuboid :
2
6
7
Ashin Siby
SJC22MCA-2014
07-06-2023

Area of square-> 4
Area of rectangle-> 12
Area of cuboid-> 136
sjcet@Z238-UL:~/ashin/s2/java/cycle 3$
```

2) Create a class 'Employee' with data members Empid, Name, Salary, Address and constructors to initialize the data members. Create another class 'Teacher' that inherit the properties of class employee and contain its own data members department, Subjects taught and constructors to initialize these data members and also include display function to display all the data members. Use array of objects to display details of N teachers.

Code:

```java
import java.util.Scanner;
class Employee {
    protected int empId;
    protected String name;
    protected double salary;
    protected String address;
    public Employee(int empId, String name, double salary, String address) {
        this.empId = empId;
        this.name = name;
        this.salary = salary;
        this.address = address;
    }
}
class Teacher extends Employee {
    private String department;
    private String subjectsTaught;

    public Teacher(int empId, String name, double salary, String address, String department, String subjectsTaught) {
        super(empId, name, salary, address);
        this.department = department;
        this.subjectsTaught = subjectsTaught;
    }

    public void display() {
        System.out.println("Employee ID: " + empId);
        System.out.println("Name: " + name);
        System.out.println("Salary: " + salary);
        System.out.println("Address: " + address);
        System.out.println("Department: " + department);
        System.out.println("Subjects Taught: " + subjectsTaught);
        System.out.println("--------------------------");
    }
}
public class Main {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);
```

```java
        System.out.println("--------------------------");
        System.out.println("Ashin Siby");
        System.out.println("22MCA014");
        System.out.println("09-06-2023");
        System.out.println("--------------------------");
        System.out.print("Enter the number of teachers: ");
        int numTeachers = scanner.nextInt();
        scanner.nextLine(); // Consume the newline character
        Teacher[] teachers = new Teacher[numTeachers];
        for (int i = 0; i < numTeachers; i++) {
        System.out.println("Enter details for Teacher " + (i + 1));
        System.out.print("Employee ID: ");
        int empId = scanner.nextInt();
        scanner.nextLine();
        System.out.print("Name: ");
        String name = scanner.nextLine();
        System.out.print("Salary: ");
        double salary = scanner.nextDouble();
        scanner.nextLine();
        System.out.print("Address: ");
        String address = scanner.nextLine();
        System.out.print("Department: ");
        String department = scanner.nextLine();
        System.out.print("Subjects Taught: ");
        String subjectsTaught = scanner.nextLine();
        teachers[i] = new Teacher(empId, name, salary, address, department, subjectsTaught);
        }
       scanner.close();
       System.out.println("\nDetails of Teachers:");
       for (Teacher teacher : teachers) {
       teacher.display();
       }
      }
     }
```

Output

```
ashin@ashin-B250M-D3H:~/s2/java/cycle 3$ javac Main.java
ashin@ashin-B250M-D3H:~/s2/java/cycle 3$ java Main
---------------------------
Ashin Siby
22MCA014
09-06-2023
---------------------------
Enter the number of teachers: 1
Enter details for Teacher 1
Employee ID: 12
Name: abc
Salary: 123456
Address: asfgy
Department: wert
Subjects Taught: wert

Details of Teachers:
Employee ID: 12
Name: abc
Salary: 123456.0
Address: asfgy
Department: wert
Subjects Taught: wert
---------------------------
```

3) Create a class 'Person' with data members Name, Gender, Address, Age and a constructor to initialize the data members and another class 'Employee' that inherits the properties of class Person and also contains its own data members like Empid, Company_name, Qualification, Salary and its own constructor. Create another class 'Teacher' that inherits the properties of class Employee and contains its own data members like Subject, Department, Teacherid and also contain constructors and methods to display the data members. Use array of objects to display details of N teachers.

Code:

```java
import java.util.*;
class Person{
  String Name;
  String Gender;
  String Address;
  String Age;
  public Person(String Name,String Gender,String Address,String Age){
    this.Name=Name;
    this.Gender=Gender;
    this.Address=Address;
    this.Age=Age;
  }
}
class Employee extends Person {
  String Empid;
  String Company_Name;
  String Qualification;
  String Salary;
  public  Employee(String  Name,String  Gender,String  Address,String  Age ,String  Empid,String Company_Name, String Qualification,String Salary){
    super(Name,Gender,Address,Age);
    this.Empid= Empid;
    this.Company_Name=Company_Name;
    this.Qualification=Qualification;
    this.Salary=Salary;
  }
}
class Teacher extends Employee{
  String Teacherid;
  String Department;
  String Subject;
  public  Teacher(String  Name,String  Gender,String  Address,String  Age,String  Empid,String Company_Name,String Qualification,String Salary,String Teacherid,String Department,String Subject){
    super(Name,Gender,Address,Age,Empid,Name,Qualification, Salary);
    this.Teacherid=Teacherid;
```

```java
        this.Department=Department;
        this.Subject=Subject;
        }
        public void read(){
        Scanner in =new Scanner(System.in);
        System.out.println("enter the Name=");
        Name=in.nextLine();
        System.out.println("enter the Gender=");
        Gender=in.nextLine();
        System.out.println("enter the Address=");
        Address=in.nextLine();
        System.out.println("enter the Age=");
        Age=in.nextLine();
        System.out.println("enter the Employ id=");
        Empid=in.nextLine();
        System.out.println("enter the Company Name=");
        Company_Name=in.nextLine();
        System.out.println("enter the Qualification=");
        Qualification=in.nextLine();
        System.out.println("enter the Salary=");
        Salary=in.nextLine();
        System.out.println("enter the Teacher id=");
        Teacherid=in.nextLine();
        System.out.println("enter the Department=");
        Department=in.nextLine();
        System.out.println("Enter the Subject=");
        Subject=in.nextLine();
        }
        public void display(){
        System.out.println("_____Employee Details_____");
        System.out.println("Name="+ Name);
        System.out.println("Gender=" + Gender);
        System.out.println("Address=" + Address);
        System.out.println("Age=" + Age);
        System.out.println("Empid=" + Empid);
        System.out.println("Company Name=" + Company_Name);
        System.out.println("Qualification=" + Qualification);
        System.out.println("Salary=" + Salary);
        System.out.println("Teacher id=" + Teacherid);
        System.out.println("Department=" + Department);
        System.out.println("Subject=" + Subject);
        System.out.println("+++++++++++++++++++++++++++++++++++++++++++++++++++++");
        }
    }
    public class InheritancePerson{
        public static void main(String Args[]){
```

```java
        System.out.println("Ashin Siby");
        System.out.println("SJC22MCA-2014");
        System.out.println("07-06-2023");
        System.out.println("20MCA132 , Object Oriented Programming Lab \n\n");
        int i,n;
        Scanner in =new Scanner(System.in);
        System.out.println("Enter the Number of employee=");
        n=in.nextInt();
        Teacher T[] = new Teacher[n];
        for(i=0;i<n;i++){
           T[i]=new

Teacher("Name","Gender","Address","Age","Empid","Name","Qualification","Salary","Teacherid","De
partment","Subject");
             T[i].read();
        }
        for(i=0;i<n;i++){
           T[i].display();
        }
     }
  }
```

Output

```
ashin@ashin-B250M-D3H:~/s2/java/cycle 3$ java InheritancePerson
Ashin Siby
SJC22MCA-2014
07-06-2023
20MCA132 , Object Oriented Programming Lab


Enter the Number of employee=
1
enter the Name=
sad
enter the Gender=
sfs
enter the Address=
fs
enter the Age=
43
enter the Employ id=
534
enter the Company Name=
fsdr
enter the Qualification=
gtdr
enter the Salary=
5436546
enter the Teacher id=
34
enter the Department=
fg
Enter the Subject=
freg
_____Employee Details_____
Name=sad
Gender=sfs
Address=fs
Age=43
Empid=534
Company Name=fsdr
Qualification=gtdr
Salary=5436546
Teacher id=34
Department=fg
Subject=freg
+++++++++++++++++++++++++++++++++++++++++++++++
ashin@ashin-B250M-D3H:~/s2/java/cycle 3$
```

4) Write a program has class Publisher, Book, Literature and Fiction. Read the information and print the details of books from either the category, using inheritance.

Code:

```java
import java.util.Scanner;
class Publisher{
  int publisher_id;
  String publisher_name;
  Publisher(int publisher_id, String publisher_name){
    this.publisher_id= publisher_id;
    this.publisher_name= publisher_name;
  }
}
class Book extends Publisher{
  int book_id;
  String book_name;
  Book(int publisher_id, String publisher_name, int book_id, String book_name) {
    super(publisher_id, publisher_name);
    this.book_id= book_id;
    this.book_name= book_name;
  }
}
class Literature extends Book{
  int literature_id;
  String literature_theme;
  Literature(int publisher_id, String publisher_name, int book_id, String book_name, int literature_id,
String literature_theme) {
    super(publisher_id, publisher_name, book_id, book_name);
    this.literature_id= literature_id;
    this.literature_theme= literature_theme;
}
void displayDetails() {
  System.out.println("The publisher ID of the book is: " + this.publisher_id);
  System.out.println("The publisher name of the book is: " + this.publisher_name);
  System.out.println("The Book ID of the book is: " + this.book_id);
  System.out.println("The Book name of the book is: " + this.book_name);
  System.out.println("The Literature ID of the book is: " + this.literature_id);
  System.out.println("The Literature theme of the book is: " + this.literature_theme);
  }
}
class Fiction extends Book{
  int fiction_id;
  String fiction_theme;
  Fiction(int publisher_id, String publisher_name, int book_id, String book_name, int fiction_id, String
fiction_theme) {
```

```java
        super(publisher_id, publisher_name, book_id, book_name);
        this.fiction_id= fiction_id;
        this.fiction_theme= fiction_theme;
      }
     void displayDetails() {
       System.out.println("The publisher ID of the book is: " + this.publisher_id);
       System.out.println("The publisher name of the book is: " + this.publisher_name);
       System.out.println("The Book ID of the book is: " + this.book_id);
       System.out.println("The Book name of the book is: " + this.book_name);
       System.out.println("The Fiction ID of the book is: " + this.fiction_id);
       System.out.println("The Fiction theme of the book is: " + this.fiction_theme);
     }
    }
    public class BookInheritance {
       public static void main(String[] args) {

          System.out.println("Ashin Siby");
          System.out.println("SJC22MCA-2014");
          System.out.println("10-06-2023");
          System.out.println("20MCA132 , Object Oriented Programming Lab \n\n");
          Literature    literature=    new    Literature(10,"Robert    Kiyozaki",200,"Rich    Dad    Poor
    Dad",2001,"Drama");
          Fiction fiction= new Fiction(101, "F. Scott Fitzgerald", 301, "The Great Gatsby",301, "Fantasy-
    Fiction");
          literature.displayDetails();
          System.out.println("\n");
          fiction.displayDetails();
       }
    }
```

Output

```
ashin@ashin-B250M-D3H:~/s2/java/cycle 3$ javac BookInheritance.java
ashin@ashin-B250M-D3H:~/s2/java/cycle 3$ java BookInheritance
Ashin Siby
SJC22MCA-2014
10-06-2023
20MCA132 , Object Oriented Programming Lab


The publisher ID of the book is: 10
The publisher name of the book is: Robert Kiyozaki
The Book ID of the book is: 200
The Book name of the book is: Rich Dad Poor Dad
The Literature ID of the book is: 2001
The Literature theme of the book is: Drama


The publisher ID of the book is: 101
The publisher name of the book is: F. Scott Fitzgerald
The Book ID of the book is: 301
The Book name of the book is: The Great Gatsby
The Fiction ID of the book is: 301
The Fiction theme of the book is: Fantasy-Fiction
```

5) Create classes Student and Sports. Create another class Result inherited from Student and Sports. Display the academic and sports score of a student.

Code:

```java
import java.util.Scanner;
class student{
  int roll;
  String name;
  int phy,eng,maths;
  student(){
    Scanner sc1= new Scanner(System.in);
    System.out.println("Enter the roll number:");
    roll =sc1.nextInt();
    System.out.println("Enter name:");
    name=sc1.next();
    System.out.println("Enter physics mark:");
    phy =sc1.nextInt();
    System.out.println("Enter english mark:");
    eng =sc1.nextInt();
    System.out.println("Enter maths mark:");
    maths =sc1.nextInt();
  }
}
class sports extends student{
    int fscore,cscore;
     sports(){
       Scanner sc2= new Scanner(System.in);
       System.out.println("Enter football score:");
       fscore=sc2.nextInt();
       System.out.println("Enter Cricket score:");
       cscore=sc2.nextInt();
     }
}
class Result extends sports{
    void display(){
      System.out.println("Academic Details"+"\n"+" ");
      System.out.println("Name : " + name);
      System.out.println("Roll No : " + roll);
      System.out.println("");
      System.out.println("MARKS" +"\n" + " ");
      System.out.println("Physics :" + phy);
      System.out.println("English :" + eng);
      System.out.println("Maths :" + maths);
      System.out.println("Total subject mark:"+(phy+eng+maths));
      System.out.println("");
```

```java
            System.out.println("SPORTS SCORE" +"\n"+" ");
            System.out.println("Football : " + fscore);
            System.out.println("Cricket : " + cscore);
            System.out.println("Total Sports mark:"+(fscore+cscore));
        }
    }
    public class FResult{
        public static void main(String[] args) {
            System.out.println("Ashin Siby");
            System.out.println("SJC22MCA-2014");
            System.out.println("12-06-2023");
            System.out.println("20MCA132 , Object Oriented Programming Lab \n\n");
            Result rs =new Result();
            rs.display();
        }
    }
```

Output

```
ashin@ashin-B250M-D3H:~/s2/java/cycle 3$ javac FResult.java
ashin@ashin-B250M-D3H:~/s2/java/cycle 3$ java FResult
Ashin Siby
SJC22MCA-2014
12-06-2023
20MCA132 , Object Oriented Programming Lab


Enter the roll number:
1
Enter name:
abc
Enter physics mark:
45
Enter english mark:
48
Enter maths mark:
44
Enter football score:
40
Enter Cricket score:
45
Academic Details

Name : abc
Roll No : 1

MARKS

Physics :45
English :48
Maths :44
Total subject mark:137

SPORTS SCORE

Football : 40
Cricket : 45
Total Sports mark:85
ashin@ashin-B250M-D3H:~/s2/java/cycle 3$
```

6) Create an interface having prototypes of functions area() and perimeter(). Create two classes Circle and Rectangle which implements the above interface. Create a menu driven program to find area and perimeter of objects.

Code:

```java
import java.util.*;
import java.lang.*;
interface Shape {
   float pi = 3.14F;
   float area();
   float perimeter();
}
class Circle implements Shape {
   Scanner sc = new Scanner(System.in);
   int r;
   public float area() {
   System.out.print("Enter the radius : ");
   r = Integer.parseInt(sc.nextLine());
   return (pi * r * r);
   }
   public float perimeter() {
    System.out.print("Enter the radius : ");
    r = Integer.parseInt(sc.nextLine());
    return (2 * pi * r);
   }
}
class Rectangle implements Shape {
   Scanner sc = new Scanner(System.in);
   int l, b;
   public float area() {
     System.out.print("Enter the Length : ");
     l = Integer.parseInt(sc.nextLine());
     System.out.print("Enter the breadth : ");
     b = Integer.parseInt(sc.nextLine());
    return (l * b);
   }
   public float perimeter() {
     System.out.print("Enter the Length : ");
     l = Integer.parseInt(sc.nextLine());
     System.out.print("Enter the breadth : ");
     b = Integer.parseInt(sc.nextLine());
     return (2 * (l + b));
   }
}
```

```java
class ShapeInterface {
   public static void main(String args[]) {
      System.out.println("Ashin Siby");
      System.out.println("SJC22MCA-2014");
      System.out.println("13-06-2023");
      System.out.println("20MCA132 , Object Oriented Programming Lab \n\n");
      Scanner sc = new Scanner(System.in);
      Circle c = new Circle();
      Rectangle r = new Rectangle();
      int ch;
      while (true) {
        System.out.println("1:Area of Circle");
        System.out.println("2:Perimeter of Circle");
        System.out.println("3:Area of Rectangle");
        System.out.println("4:Perimter of Rectangle");
        System.out.println("5:EXIT");
        System.out.print("Enter choice : ");
        ch = Integer.parseInt(sc.nextLine());
        switch (ch) {
           case 1:
           float ar = c.area();
           System.out.println("Area :" + ar);
           System.out.println("**----------** --------- **");
           break;
           case 2:
           float pr = c.perimeter();
           System.out.println("Perimeter of Circle = "+pr);
           System.out.println("**----------** --------- **");
           break;
           case 3:
           float a = r.area();
           System.out.println("Area :" + a);
           System.out.println("**----------** --------- **");
           break;
           case 4:
           float pr1 = r.perimeter();
           System.out.println("Perimeter of Rectangle = "+pr1);
           System.out.println("**----------** --------- **");
           break;
           case 5:
           System.out.println("Exiting the Program!!!!!");
           System.exit(0);
           default:
           System.out.println("invalid!");
          }
```

```
        }
      }
    }
```

Output

```
ashin@ashin-B250M-D3H:~/s2/java/cycle 3$ javac ShapeInterface.java
ashin@ashin-B250M-D3H:~/s2/java/cycle 3$ java ShapeInterface
Ashin Siby
SJC22MCA-2014
13-06-2023
20MCA132 , Object Oriented Programming Lab


1:Area of Circle
2:Perimeter of Circle
3:Area of Rectangle
4:Perimter of Rectangle
5:EXIT
Enter choice : 1
Enter the radius : 2
Area :12.56
**-----------** --------- **
1:Area of Circle
2:Perimeter of Circle
3:Area of Rectangle
4:Perimter of Rectangle
5:EXIT
Enter choice : 2
Enter the radius : 4
Perimeter of Circle = 25.12
**-----------** --------- **
```

7) Prepare bill with the given format using calculate method from interface.

Order No.				
Date :				
Product Id	Name	Quantity	unit price	Total
101	A	2	25	50
102	B	1	100	100
			Net. Amount	150

Code:

```java
import java.text.SimpleDateFormat;
import java.util.Date;
interface bill{
   void cal();
}
class details1 implements bill{
   int pid=101,q=2,uprice=25,t1;
   String name1="A";
   public void cal(){
   t1=q*uprice;
   }
}
class details2 extends details1 {
   int pid2=102,q2=1,uprice2=100,t2;
   String name2="B";
   SimpleDateFormat f=new SimpleDateFormat("dd/MM/yy");
   Date d= new Date();
   public void cal(){
     super.cal();
     t2=q2*uprice2;
}
public void display(){
   System.out.println("Order No.384\n");
   System.out.println("Date: "+f.format(d));
   System.out.println("\nProduct Id\tName\t\tQuantity\tunit price\tTotal");

System.out.println("_____
_____");
   System.out.println(pid+"\t\t"+name1+"\t\t"+q+"\t\t"+uprice+"\t\t"+t1);
   System.out.println(pid2+"\t\t"+name2+"\t\t"+q2+"\t\t"+uprice2+"\t\t"+t2);
```

```
    System.out.println("_____
    _____");
      System.out.println("\t\t\t\t\t\tNet.Amount"+"\t"+(t1+t2));
      }
    }
    public class Electricitybill{
      public static void main(String[] args) {
       System.out.println("Ashin Siby");
       System.out.println("SJC22MCA-2014");
       System.out.println("15-06-2023");
       System.out.println("20MCA132 , Object Oriented Programming Lab \n\n");
      details2 obj2=new details2();
      obj2.cal();
      obj2.display();
      }
    }
```

Output

```
ashin@ashin-B250M-D3H:~/s2/java/cycle 3$ javac Electricitybill.java
ashin@ashin-B250M-D3H:~/s2/java/cycle 3$ java Electricitybill
Ashin Siby
SJC22MCA-2014
15-06-2023
20MCA132 , Object Oriented Programming Lab


Order No.384

Date: 16/06/23

Product Id        Name              Quantity          unit price        Total
_____
101               A                 2                 25                50
102               B                 1                 100               100
_____
                                                      Net.Amount        150
ashin@ashin-B250M-D3H:~/s2/java/cycle 3$ ▊
```