**Week-2 Lab**

**Date: April 21, 2025**

**Problem Statements:**

**2.1 WAP to find out the sum of command line arguments.**

*public* class **q1** {

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

*int* sum **=** 0**;**

**for** (*int* i **=** 0**;** i **<** args**.***length***;** i**++**) {

*// Convert each argument from String to int*

            sum **+=** Integer**.**parseInt(args[i])**;**

        }

        System**.***out***.**println("Sum = " **+** sum)**;**

    }

}

Output – javac q1.java

java q1.java 1 2 3

Sum = 6

**2.2 WAP to count the number of characters in a given string, to reverse the string and check whether it is palindrome or not?**

*import* java**.**util**.**Scanner**;**

*public* class **q2**{

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

        Scanner obj **=** **new** Scanner(System**.***in*)**;**

        System**.***out***.**println("Enter a string")**;**

        String s **=** obj**.**nextLine()**;**

*int* n **=** s**.**length()**;**

        System**.***out***.**println("Characters in string are:"**+**n)**;**

        String reversed **=** ""**;**

**for**(*int* i **=** n**-**1**;**i**>=**0**;**i**--**){

            reversed **+=** s**.**charAt(i)**;**

        }

        System**.***out***.**println("Reversed String is: "**+**reversed)**;**

**if**(s**.**equals(reversed)){

            System**.***out***.**println("String is palindromic string.")**;**

        }

**else**{

            System**.***out***.**println("String is not a palindromic string.")**;**

        }

        obj**.**close()**;**

    }

}

Output – javac q2.java

java q2.java

Enter a string

anna

Characters in string are:4

Reversed String is: anna

String is palindromic string.

**2.3 WAP to Find largest and smallest numbers in an array.**

*import* java**.**util**.**Scanner**;**

*public* class **q3** {

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

        Scanner obj **=** **new** Scanner(System**.***in*)**;**

        System**.***out***.**println("enter size of the array:")**;**

*int* size **=** obj**.**nextInt()**;**

*int*[] arr **=** **new** *int*[size]**;**

        System**.***out***.**println("enter array numbers:")**;**

**for**(*int* i**=**0**;**i**<**size**;**i**++**){

            arr[i] **=** obj**.**nextInt()**;**

        }

*int* maxi **=** Integer**.***MIN\_VALUE***;**

*int* mini **=** Integer**.***MAX\_VALUE***;**

**for**(*int* i**=**0**;**i**<**size**;**i**++**){

**if**(arr[i]**>**maxi){

                maxi **=** arr[i]**;**

            }

**if**(arr[i]**<**mini){

                mini **=** arr[i]**;**

            }

        }

        System**.***out***.**println("Maximum and minimum elemts in the array are: "**+**maxi**+**" "**+**mini)**;**

        obj**.**close()**;**

    }

}

Output – javac q3.java

java q3.java

enter size of the array:

6

enter array numbers:

3

6

5

9

8

2

Maximum and minimum elements in the array are: 9 2

**2.4 Java Program to Find the Sum and Product of Elements in a Row/Column of a Matrix.**

*import* java**.**util**.**Scanner**;**

*public* class **q4** {

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

        Scanner obj **=new** Scanner(System**.***in*)**;**

        System**.***out***.**println("enter size of the row:")**;**

*int* row **=** obj**.**nextInt()**;**

        System**.***out***.**println("enter size of the column:")**;**

*int* col **=** obj**.**nextInt()**;**

*int*[][] arr **=** **new** *int*[row][col]**;**

        System**.***out***.**println("enter array numbers:")**;**

**for**(*int* i**=**0**;**i**<**row**;**i**++**){

**for**(*int* j**=**0**;**j**<**col**;**j**++**){

                arr[i][j] **=** obj**.**nextInt()**;**

            }

        }

**for**(*int* i**=**0**;**i**<**row**;**i**++**){

*int* sum **=** 0**;**

*int* product **=** 1**;**

**for**(*int* j**=**0**;**j**<**col**;**j**++**){

                sum **=** sum **+**arr[i][j]**;**

                product **=** product**\***arr[i][j]**;**

            }

            System**.***out***.**println("Sum and product of row "**+** i **+**" are: "**+**sum**+**" "**+**product)**;**

        }

**for** (*int* j **=** 0**;** j **<** col**;** j**++**) {

*int* sum **=** 0**;**

*int* product **=** 1**;**

**for** (*int* i **=** 0**;** i **<** row**;** i**++**) {

                sum **+=** arr[i][j]**;**

                product **\*=** arr[i][j]**;**

            }

            System**.***out***.**println("Sum and product of column " **+** j **+** " are: " **+** sum **+** " " **+** product)**;**

        }

        obj**.**close()**;**

    }

}

Output – javac q4.java

java q4.java

enter size of the row:

3

enter size of the column:

3

enter array numbers:

3

6

5

2

9

4

6

3

2

Sum and product of row 0 are: 14 90

Sum and product of row 1 are: 15 72

Sum and product of row 2 are: 11 36

Sum and product of column 0 are: 11 36

Sum and product of column 1 are: 18 162

Sum and product of column 2 are: 11 40

**2.5 WAP to create class Number with only one private instance variable as a double primitive type, include the following methods isZero(), isPositive(), isNegative( ), isOdd( ), isEven( ), isPrime(), isAmstrong() in this class and all above methods should return boolean primitive type like for isPositive() should return “Positive = True”.**

*import* java**.**util**.**Scanner**;**

class **q5**{

*private* *double* num**;**

*public* q5(*double* **num**) {

*this***.***num* **=** num**;**

    }

    Boolean isZero(){

**if**(*this***.***num* **==** 0){

**return** true**;**

        }

**else**{

**return** false**;**

        }

    }

    Boolean isPositive(){

**if**(num **>** 0){

**return** true**;**

        }

**else**{

**return** false**;**

        }

    }

    Boolean isNegative(){

**if**(num **<** 0){

**return** true**;**

        }

**else**{

**return** false**;**

        }

    }

    Boolean isOdd(){

**if**(num**%**2 **!=** 0){

**return** true**;**

        }

**else**{

**return** false**;**

        }

    }

    Boolean isEven(){

**if**(num**%**2 **==** 0){

**return** true**;**

        }

**else**{

**return** false**;**

        }

    }

    Boolean isPrime(){

**for**(*int* i **=**2**;**i**<=**num**/**2**;**i**++**){

**if**(num**%**i **==** 0){

**return** false**;**

            }

        }

**return** true**;**

    }

    Boolean isArmstrong(){

*int* n **=** (*int*) *this***.***num***;**

*int* sum **=** 0**,** temp **=** n**,** digits **=** 0**;**

**while** (temp **>** 0) {

            temp **/=** 10**;**

            digits**++;**

        }

        temp **=** n**;**

**while** (temp **>** 0) {

*int* digit **=** temp **%** 10**;**

            sum **+=** Math**.**pow(digit**,** digits)**;**

            temp **/=** 10**;**

        }

**return** sum **==** n**;**

    }

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

        Scanner obj **=** **new** Scanner(System**.***in*)**;**

        System**.***out***.**println("Enter a number")**;**

*double* n **=** obj**.**nextDouble()**;**

        q5 n1 **=** **new** q5(n)**;**

        System**.***out***.**println("Number is zero: "**+**n1**.**isZero())**;**

        System**.***out***.**println("Number is positive: "**+**n1**.**isPositive())**;**

        System**.***out***.**println("Number is negative: "**+**n1**.**isNegative())**;**

        System**.***out***.**println("Number is odd: "**+**n1**.**isOdd())**;**

        System**.***out***.**println("Number is even: "**+**n1**.**isEven())**;**

        System**.***out***.**println("Number is prime: "**+**n1**.**isPrime())**;**

        System**.***out***.**println("Number is Armstrong: "**+**n1**.**isArmstrong())**;**

        obj**.**close()**;**

    }

}

Output – javac q5.java

java q5.java

Enter a number

6

Number is zero: false

Number is positive: true

Number is negative: false

Number is odd: false

Number is even: true

Number is prime: false

Number is Armstrong: true

**2.6 WAP to insert 3 numbers from the keyboard and find a greater number among 3 numbers.**

*import* java**.**util**.**Scanner**;**

*public* class **q6** {

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

        Scanner obj **=** **new** Scanner(System**.***in*)**;**

*int* max **=** Integer**.***MIN\_VALUE***;**

*int* p  **=** 3**;**

**while**(p**>**0){

            System**.***out***.**println("Enter "**+**(4**-**p) **+**" number: ")**;**

*int* num **=** obj**.**nextInt()**;**

**if**(num**>**max){

                max **=** num**;**

            }

            p**--;**

        }

        System**.***out***.**println("Maximum Number is: "**+**max)**;**

        obj**.**close()**;**

    }

}

Output – javac q6.java

java q6.java

Enter 1 number:

6

Enter 2 number:

9

Enter 3 number:

3

Maximum Number is: 9

**2.7 WAP to illustrate use of this keyword.**

*public* class **q7** {

*int* id**;**

    String name**;**

    q7(*int* **id,** String **name**) {

*this***.***id* **=** id**;**

*this***.***name* **=** name**;**

    }

*void* display() {

*this***.**show()**;**

        System**.***out***.**println("ID: " **+** id **+** ", Name: " **+** name)**;**

    }

*void* show() {

        System**.***out***.**println("Inside show() method")**;**

    }

    q7 getObject() {

**return** *this***;**

    }

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

        q7 obj **=** **new** q7(101**,** "Alice")**;**

        obj**.**display()**;**

        q7 returnedObj **=** obj**.**getObject()**;**

        System**.***out***.**println("Returned Object HashCode: " **+** returnedObj**.**hashCode())**;**

    }

}

Output – javac q7.java

java q7.java

Inside show() method

ID: 101, Name: Alice

Returned Object HashCode: 393040818

**2.8 Write a program to demonstrate static variables, methods, and blocks.**

*public* class **q8** {

*static* *int* staticCounter**;**

*int* instanceCounter**;**

*static* {

        System**.***out***.**println("Static block executed.")**;**

        staticCounter **=** 10**;**

    }

*public* q8() {

        staticCounter**++;**

        instanceCounter**++;**

        System**.***out***.**println("Constructor executed.")**;**

    }

*static* *void* displayStaticCounter() {

        System**.***out***.**println("Static counter: " **+** staticCounter)**;**

    }

*void* displayInstanceCounter() {

        System**.***out***.**println("Instance counter: " **+** instanceCounter)**;**

    }

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

        System**.***out***.**println("Main method started.")**;**

        q8**.**displayStaticCounter()**;**

        q8 obj1 **=** **new** q8()**;**

        obj1**.**displayStaticCounter()**;**

        obj1**.**displayInstanceCounter()**;**

        q8 obj2 **=** **new** q8()**;**

        obj2**.**displayStaticCounter()**;**

        obj2**.**displayInstanceCounter()**;**

        q8**.**displayStaticCounter()**;**

    }

}

Output – javac q8.java

java q8.java

Static block executed.

Main method started.

Static counter: 10

Constructor executed.

Static counter: 11

Instance counter: 1

Constructor executed.

Static counter: 12

Instance counter: 1

Static counter: 12

**2.9 WAP to create a class named Shape and create three subclasses Circle, Triangle and Square, each class has two-member functions named draw () and erase (). Implement this concept using polymorphism.**

class **Shape** {

*void* draw() {

        System**.***out***.**println("Drawing a shape")**;**

    }

*void* erase() {

        System**.***out***.**println("Erasing a shape")**;**

    }

}

class **Circle** *extends* *Shape* {

*void* draw() {

        System**.***out***.**println("Drawing a circle")**;**

    }

*void* erase() {

        System**.***out***.**println("Erasing a circle")**;**

    }

}

class **Triangle** *extends* *Shape* {

*void* draw() {

        System**.***out***.**println("Drawing a triangle")**;**

    }

*void* erase() {

        System**.***out***.**println("Erasing a triangle")**;**

    }

}

class **Square** *extends* *Shape* {

*void* draw() {

        System**.***out***.**println("Drawing a square")**;**

    }

*void* erase() {

        System**.***out***.**println("Erasing a square")**;**

    }

}

*public* class **q9** {

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

        Shape s**;**

        s **=** **new** Circle()**;**

        s**.**draw()**;**

        s**.**erase()**;**

        s **=** **new** Triangle()**;**

        s**.**draw()**;**

        s**.**erase()**;**

        s **=** **new** Square()**;**

        s**.**draw()**;**

        s**.**erase()**;**

    }

}

Output – javac q9.java

java q9.java

Drawing a circle

Erasing a circle

Drawing a triangle

Erasing a triangle

Drawing a square

Erasing a square

**2.10 WAP to create a class Employee with a method called calculateSalary(). Create two subclasses Manager and Programmer. In each subclass, override the calculateSalary() method to calculate and return the salary based on their specific roles.**

class **Employee** {

*double* calculateSalary() {

**return** 0.0**;**

    }

}

class **Manager** *extends* *Employee* {

*double* calculateSalary() {

*double* baseSalary **=** 50000**;**

*double* bonus **=** 20000**;**

**return** baseSalary **+** bonus**;**

    }

}

class **Programmer** *extends* *Employee* {

*double* calculateSalary() {

*double* baseSalary **=** 40000**;**

*double* overtime **=** 10000**;**

**return** baseSalary **+** overtime**;**

    }

}

*public* class **q10** {

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

        Employee e**;**

        e **=** **new** Manager()**;**

        System**.***out***.**println("Manager Salary: " **+** e**.**calculateSalary())**;**

        e **=** **new** Programmer()**;**

        System**.***out***.**println("Programmer Salary: " **+** e**.**calculateSalary())**;**

    }

}

Output – javac q10.java

java q10.java

Manager Salary: 70000.0

Programmer Salary: 50000.0

**2.11 WAP to count the total number of odd numbers between 1-100, and display the sum of them.**

*public* class **q11** {

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

*int* oddnumber **=** 0**;**

*int* sum **=** 0**;**

**for**(*int* i**=**1**;**i**<=**100**;**i**++**){

**if**(i**%**2**!=**0){

            oddnumber**++;**

            sum **=** sum**+**i**;**

        }

    }

    System**.***out***.**println("Number of odd number is: "**+**oddnumber**+**" their sum is: "**+**sum)**;**

   }

}

Output – javac q11.java

java q11.java

Number of odd number is: 50 their sum is: 2500