1. **Program to perform different Matrix operations using arrays**

**Aim**

The program performs element-wise addition, subtraction and multiplication of two 3x3 matrices a and b. It then prints the resulting matrix after the operation.

**Algorithm**

Step 1: Input matrices a and b.

Step 2: Initialize dimensions n (rows) and m (columns) from matrix a.

Step 3: Create result matrix result with dimensions n x m initialized to 0.

Step 4: Loop through each row i of matrix a:

Loop through each column j of matrix b:

Set result[i][j] to 0.

Loop through each element k:

Add a[i][k] by b[k][j] and store to result[i][j].

Subtract a[i][k] by b[k][j] and store to result[i][j].

Multiply a[i][k] by b[k][j] and add to result[i][j].

Step 5: Print "Matrix after Operation:"

Step 6: Loop through each row i of the result matrix:

Loop through each column j of the result matrix:

Print result[i][j] followed by a space.

// class for performing different operations on a MATRIX

import java.util.Scanner;

class Matrix

{

int r,c,k;

// method for ADDITION

void add(int a[][],int b[][])

{

int c[][]=new int[a.length][b[0].length];

for(int i=0;i<a.length;i++)

{

for(int j=0;j<b[0].length;j++)

{

c[i][j]=a[i][j]+b[i][j];

System.out.print(" "+c[i][j]);

}

System.out.println(" ");

}

}

// method for MULTIPLICATION

void mul(int a[][],int b[][])

{

int c[][]=new int[a.length][b[0].length];

for(int i=0;i<a.length;i++)

for(int j=0;j<b[0].length;j++)

for(int k=0;k<a[0].length;k++)

c[i][j]+=a[i][k]\*b[k][j];

for(int i=0;i<a.length;i++)

{

for(int j=0;j<b[0].length;j++)

System.out.print(" "+c[i][j]);

System.out.println(" ");

}

}

// method for subtraction

void sub(int a[][],int b[][])

{

int c[][]=new int[a.length][b[0].length];

for(int i=0;i<a.length;i++)

{

for(int j=0;j<b[0].length;j++)

{

c[i][j]=a[i][j]-b[i][j];

System.out.print(" "+c[i][j]);

}

System.out.println(" ");

}

}

}

// MAIN CLASS

class MatOperations1

{

public static void main(String args[])

{

int z;

Matrix m=new Matrix();

Scanner s=new Scanner(System.in);

int x[][]=new int[4][4];

int y[][]=new int[4][4];

System.out.println("Enter matrx A ");

for(int i=0;i<4;i++)

for(int j=0;j<4;j++)

x[i][j]=s.nextInt();

System.out.println("Enter matrx B ");

for(int i=0;i<4;i++)

for(int j=0;j<4;j++)

y[i][j]=s.nextInt();

System.out.println("Enter your choice 1> Multiplication 2>Addition 3> Subtraction");

z=s.nextInt();

if(z==1)

m.mul(x,y);

else

if(z==2)

m.add(x,y);

else

if(z==3)

m.sub(x,y);

else

System.out.println("Invalid option");

}

}

**2. Program to perform String Operations**

**Aim:**

The aim of this program is to perform various operations on two input strings, such as length calculation, concatenation, case conversion, substring extraction, checks character occurrence, replaces characters, and compares the two strings.

**Algorithm:**

1. Initialize two empty strings, first and second.
2. Create a Scanner object for input.
3. Prompt the user to enter the first string and store it in first.
4. Prompt the user to enter the second string and store it in second.
5. Display the entered strings along with their lengths.
6. Concatenate the two strings with a space in between and display the result.
7. Display the first character, uppercase, and lowercase versions of the first string.
8. Prompt the user to enter a character to find its occurrence in the first string and display the position.
9. Display the substring of the first string from index 3 to 6.
10. Replace all occurrences of 'a' with 'o' in the first string and display the result.
11. Check if the first and second strings are equal and display an appropriate message.

**Program:**

import java.util.\*;  
class StringOperation  
{  
    public static void main(String[] args)  
      {  
        String first="",second="";  
        Scanner sc=new Scanner(System.in);  
            System.out.println("String Operation");  
            System.out.println();  
            System.out.print("Enter the first Sting: ");  
             first=sc.nextLine();  
        System.out.print("Enter the second Sting: ");  
              second=sc.nextLine();  
            System.out.println("The strings are: "+first+" , "+second);  
         System.out.println("The length of the first string is :"+first.length());  
                System.out.println("The length of the second string is :"+second.length());  
            System.out.println("The concatenation of first and second string is :"+first.concat(" "+second));  
             System.out.println("The first character of " +first+" is: "+first.charAt(0));  
            System.out.println("The uppercase of " +first+" is: "+first.toUpperCase());  
            System.out.println("The lowercase of " +first+" is: "+first.toLowerCase());  
            System.out.print("Enter the occurance of a character in "+first+" : ");  
            String str=sc.next();  
             char c=str.charAt(0);  
            System.out.println("The "+c+" occurs at position " + first.indexOf(c)+ " in " + first);  
             System.out.println("The substring of "+first+" starting from index 3 and ending at 6 is: " + first.substring(3,7));  
            System.out.println("Replacing 'a' with 'o' in "+first+" is: "+first.replace('a','o'));         
            boolean check=first.equals(second);  
            if(!check)  
                System.out.println(first + " and " + second + " are not same.");  
            else  
                System.out.println(first + " and " + second + " are same.");   
    }  
}

**Output:**

String Operation  
  
Enter the first Sting: The World is Beautiful.  
Enter the second Sting: Learn to enjoy every moment.  
The strings are: The World is Beautiful. , Learn to enjoy every moment.  
The length of the first string is :23  
The length of the second string is :28  
The concatenation of first and second string is :The World is Beautiful. Learn to enjoy every moment.  
The first character of The World is Beautiful. is: T  
The uppercase of The World is Beautiful. is: THE WORLD IS BEAUTIFUL.  
The lowercase of The World is Beautiful. is: the world is beautiful.  
Enter the occurance of a character in The World is Beautiful. : e  
The e occurs at position 2 in The World is Beautiful.  
The substring of The World is Beautiful. starting from index 3 and ending at 6 is:  Wor  
Replacing 'a' with 'o' in The World is Beautiful. is: The World is Beoutiful.  
The World is Beautiful. and Learn to enjoy every moment. are not same.

**Result:**

The program effectively demonstrates basic string operations in Java, showcasing various manipulations and analyses of string data.

**3. Program to implement Looping Control Statements**

**3 a. for loop**

**Aim:**

The aim of this program is to print even numbers from 1 to 10 using a for loop.

**Algorithm:**

1. Start a for loop with i from 1 to 10.
2. In each iteration, check if i is even (i % 2 == 0).
3. If i is even, print the value of i.
4. After the loop, print "Loop Ending".

**Program:**

class ForLoopDemo

{

public static void main(String[] args)

{

for (int i=1; i<=10; i++)

{

if (i%2==0)

System.out.println(i);

}

System.out.println("Loop Ending");

}

}

**Output:**

2

4

6

8

10

Loop Ending

**Result:**

The program successfully demonstrates iterating through numbers 1 to 10, printing even numbers, and confirming the end of the loop execution.

**3b. While Loop**

**Aim:**

The aim of this program is to print even numbers from 1 to 10 using a while loop in Java.

**Algorithm:**

1. Initialize i to 1.
2. Enter a while loop with the condition i <= 10.
3. Check if i is even (i % 2 == 0).
4. Print i if it's even.
5. Increment i by 1 (i++).
6. Continue the loop until i is greater than 10.

**Program:**

class While\_Loop\_Demo

{

//print even numbers ranging from 1 to 10

public static void main(String args[])

{

int i = 1; //initialization

while (i<=10) //condition or termination

{

if (i%2==0)

{

System.out.println(i);

}

i++; //increment

}

}

}

**Output:**

2

4

6

8

10

**Result:** The program successfully demonstrates using a while loop to print even numbers from 1 to 10 in Java.

**3 C. Do …While loop**

**Aim:**

The aim of this program is to demonstrate printing numbers using a do-while loop, specifically printing all numbers starting from 1 and incrementing until the number becomes odd.

**Algorithm:**

1. Initialize i to 1.
2. Enter a do-while loop.
3. Print i.
4. Increment i by 1 (i++).
5. Check if i is even (i % 2 == 0).
6. Repeat steps 3 to 5 until i is not even.

**Program**

class Do\_While\_Loop\_Demo

{

//print even number

public static void main(String args[])

{

int i = 1; //initialization

do

{

System.out.println(i);

i++; //increment

} while (i%2==0);//condition or termination

}

}

**Output:**

2

4

6

8

10

Loop Ending

**Result:**

The program successfully demonstrates the use of a do-while loop to print numbers starting from 1 until an odd number is encountered.

4. Conditional Control Statements

**4a . Decision Making Statement**

**Aim:**

The aim of this program is to demonstrate the use of conditional statements.

**Algorithm:**

1. Initialize city with "Delhi".
2. Check if city equals "Meerut", "Noida", or "Agra" using an if-else-if ladder.
3. Print specific messages based on the value of city.
4. If city does not match any of the specified values, print city.

**Program:**

public class Student {

public static void main(String[] args) {

String city = "Delhi";

if(city == "Meerut") {

System.out.println("city is meerut");

}else if (city == "Noida") {

System.out.println("city is noida");

}else if(city == "Agra") {

System.out.println("city is agra");

}else {

System.out.println(city);

}

}

}

**Output:**

Delhi

**Result:**

The program successfully uses conditional statements to determine and print a message based on the value of the city variable, showcasing control flow in Java.

**4b . Switch Statement**

**Aim:**

This program is to demonstrate the use of a switch statement in Java

**Algorithm:**

1. Initialize a with 'C'.
2. Use a switch statement with a as the expression.
3. Print specific messages based on whether a matches 'A' or 'C'.
4. If a does not match any cases, print a default message

**Program:**

class Switch\_Case {

public static void main(String[] args)

{

char a = 'C';

switch (a)

{

case 'A':

System.out.println("Letter A");

break;

case 'C':

System.out.println("Letter C");

break;

default:

System.out.println("Default case: NO Letter Matched!");

}

}

}

**Output:**

Letter C

**Result:**

Thus the expected Output for the Program to implement switch Statements has been executed Successfully.