**Q1 Implement array as class and write following function in the that class**

**1. Add**

**2. Traverse**

**3. Search**

**4. Sort**

**5. Insert at position**

**6. Remove**

**7. Delete at position**

**8. Reverse**

**9. Concatenate**

**10. Sum and average**

package arraylist;

import java.util.ArrayList;

import java.util.Collections;

class Array {

private ArrayList<Integer> data;

// Constructor

public Array() {

data = new ArrayList<>();

}

// 1. Add

public void add(int value) {

data.add(value);

}

// 2. Traverse

public void traverse() {

for (int value : data) {

System.out.print(value + " ");

}

System.out.println();

}

// 3. Search

public int search(int value) {

return data.indexOf(value); // Returns -1 if not found

}

// 4. Sort

public void sort() {

Collections.sort(data);

}

// 5. Insert at position

public void insertAtPosition(int value, int position) {

if (position >= 0 && position <= data.size()) {

data.add(position, value);

} else {

System.out.println("Invalid position!");

}

}

// 6. Remove

public void remove(int value) {

if (data.contains(value)) {

data.remove(Integer.valueOf(value));

} else {

System.out.println("Value not found!");

}

}

// 7. Delete at position

public void deleteAtPosition(int position) {

if (position >= 0 && position < data.size()) {

data.remove(position);

} else {

System.out.println("Invalid position!");

}

}

// 8. Reverse

public void reverse() {

Collections.reverse(data);

}

// 9. Concatenate

public void concatenate(Array other) {

this.data.addAll(other.data);

}

// 10. Sum and Average

public void sumAndAverage() {

int sum = 0;

for (int value : data) {

sum += value;

}

double average = data.isEmpty() ? 0 : (double) sum / data.size();

System.out.println("Sum: " + sum + ", Average: " + average);

}

}

public class Main {

public static void main(String[] args) {

Array arr = new Array();

arr.add(10);

arr.add(20);

arr.add(30);

System.out.print("Traverse: ");

arr.traverse();

System.out.println("Search 20: " + arr.search(20));

arr.sort();

System.out.print("After sorting: ");

arr.traverse();

arr.insertAtPosition(15, 1);

System.out.print("After inserting 15 at position 1: ");

arr.traverse();

arr.remove(20);

System.out.print("After removing 20: ");

arr.traverse();

arr.deleteAtPosition(0);

System.out.print("After deleting at position 0: ");

arr.traverse();

arr.reverse();

System.out.print("After reversing: ");

arr.traverse();

Array arr2 = new Array();

arr2.add(50);

arr2.add(60);

arr.concatenate(arr2);

System.out.print("After concatenating: ");

arr.traverse();

arr.sumAndAverage();

}

}

**Q2. Write a program to multiply two matrixes.**

package arraylist;

public class MatrixMultiplication {

public static void main(String[] args) {

int[][] matrix1 = {

{1, 2, 3},

{4, 5, 6}

};

int[][] matrix2 = {

{7, 8},

{9, 10},

{11, 12}

};

int rows1 = matrix1.length;

int cols1 = matrix1[0].length;

int cols2 = matrix2[0].length;

int[][] result = new int[rows1][cols2];

for (int i = 0; i < rows1; i++) {

for (int j = 0; j < cols2; j++) {

for (int k = 0; k < cols1; k++) {

result[i][j] += matrix1[i][k] \* matrix2[k][j];

}

}

}

System.***out***.println("Resultant Matrix:");

for (int[] row : result) {

for (int value : row) {

System.***out***.print(value + " ");

}

System.***out***.println();

}

}

}

**Q3. Write a program for addition of two matrixes.**

package arraylist;

public class MatrixAddition {

public static void main(String[] args) {

int[][] matrix1 = {

{1, 2, 3},

{4, 5, 6}

};

int[][] matrix2 = {

{7, 8, 9},

{10, 11, 12}

};

int rows = matrix1.length;

int cols = matrix1[0].length;

int[][] result = new int[rows][cols];

for (int i = 0; i < rows; i++) {

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

result[i][j] = matrix1[i][j] + matrix2[i][j];

}

}

System.***out***.println("Resultant Matrix:");

for (int[] row : result) {

for (int value : row) {

System.***out***.print(value + " ");

}

System.***out***.println();

}

}

}

**Q4. Write a program to find transpose of a matrix.**

package arraylist;

public class MatrixTranspose {

public static void main(String[] args) {

int[][] matrix = {

{1, 2, 3},

{4, 5, 6}

};

int rows = matrix.length;

int cols = matrix[0].length;

int[][] transpose = new int[cols][rows];

for (int i = 0; i < rows; i++) {

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

transpose[j][i] = matrix[i][j];

}

}

System.***out***.println("Transpose of the Matrix:");

for (int[] row : transpose) {

for (int value : row) {

System.***out***.print(value + " ");

}

System.***out***.println();

}

}

}