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Факультет информатики и вычислительной техники

Кафедра автоматизации и управления в технических система

**Лабораторная работа № 4**

с дисциплины «СТП-1»

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Завдання: Write a program that asks the user the number of array elements, then in loop the user enter values for each item. Find the number of paired items; Find the sum of the elements multiplied by 3; Find the difference between the maximum and the minimum elements array; Find the arithmetic mean of the array; Find the sum of the largest and smallest elements of the array; Find the maximum by module element of the array

Output parameters such as the array dimension are entered from the keyboard, the contents of the array generate with Random#nextInt. After the user inputs the dimension to generate the matrix, and output take it to the screen, then complete the task and display the result.

The given positive integer n is an integer square matrix of order n. Get bi, ..., bn, where bi is: a) the sum of the elements located behind the first negative element in i-th line (if all elements of the line are non-negative, take bi = 100); b) the sum of the elements preceding the last negative element i-th line (if all elements of the line are non-negative, then take bi = -l).;

An integer matrix of order n is given. Find line numbers: a) all elements of which are zeros; b) the elements in each of them are the same.

public class Lab {

//Ex1

//reading input data

private static int[] readArray(){

int dimension = readInt();

int[] data = new int[dimension];

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

data[i]=readInt();

}

return data;

}

//number of paired items in array

private static int numOfPaired(int[] array){

int number=0;

List<Integer> numbers = new ArrayList<Integer>();

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

for(int j=i+1;j<array.length;j++){

if(array[i]==array[j] && numbers.indexOf(array[i])<0)

numbers.add(array[i]);

}

}

return numbers.size();

}

//sum of element that multiplied by 3

private static int sumOfElMyltByThree(int[] array){

int sum=0;

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

if(array[i]%3==0)

sum+=array[i];

}

return sum;

}

//difference between min and max element in array

private static int diffMinMax(int[] array){

return maxElement(array)-minElement(array);

}

//mean of array's elements

private static float mean(int[] array){

int sum=0;

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

sum+=array[i];

}

return sum/array.length;

}

//sum of the largest and the smallest elements in array

private static int sumLargAndSmall(int[] array){

int max = maxElement(array);

int min = minElement(array);

int sum = 0;

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

if(array[i]==max || array[i]==min)

sum+=array[i];

}

return sum;

}

//max element by absolute value

private static int maxAbs(int[] array){

int zero=0;

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

if(Math.abs(array[i])>zero){

zero=array[i];

}

}

return zero;

}

private static int minElement(int[]array){

int min = array[0];

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

if(array[i]<min)

min = array[i];

}

return min;

}

private static int maxElement(int[] array){

int max = array[0];

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

if(array[i]>max)

max=array[i];

}

return max;

}

//Ex2

//read matrix dimension

private static int readInt(){

try{

System.out.println("Enter integer num ");

return new Scanner(System.in).nextInt();

}catch (Exception ex){

System.out.println("Invalid symbol entered ");

return readInt();

}

}

//generating of matrix

private static int[][] genereteMatrix(){

try{

System.out.println("Enter matrix size");

int dimension = readInt();

Random rand = new Random();

int[][] result = new int[dimension][dimension];

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

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

result[i][j]= rand.nextInt(100000)-50000;

}

}

return result;

}catch(Exception ex){

return genereteMatrix();

}

}

//display matrix

private static void showMatrix(int[][] matrix){

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

for(int j =0;j<matrix[i].length;j++){

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

}

System.out.print('\n');

}

}

//displayarray

private static void showArray(int[] arr){

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

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

}

System.out.println();

}

//sum of the elements located behind the first negative element

private static int[] excersiceA(int[][] matrix){

int[] sequence=new int[matrix.length];

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

for(int j = 0;j<matrix[i].length;j++){

if(matrix[i][j]<0){

sequence[i]=0;

for(int k=j+1;k<matrix[i].length;k++){

sequence[i]+=matrix[i][k];

}

break;

}

else if(j==matrix[i].length-1){

sequence[i]=100;

}

}

}

return sequence;

}

//sum of the elements preceding the last negative element

private static int[] excersiceB(int[][] matrix){

int[] sequence=new int[matrix.length];

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

for(int j = matrix[i].length-1;j>=0;j--){

if(matrix[i][j]<0){

sequence[i]=0;

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

sequence[i]+=matrix[i][k];

}

break;

}

else if(j==matrix[i].length-1){

sequence[i]=100;

}

}

}

return sequence;

}

//number of lines all elements of which are zeros

private static int excersiceC(int[][] matrix){

int result=0;

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

int counter=0;

for (int j = 0;j<matrix[i].length;j++){

if(matrix[i][j]==0)

counter++;

}

if(counter==matrix.length)

result++;

}

return result;

}

//number of lines the elements in each of them are the same.

private static int excersiceD(int[][] matrix){

int result=0;

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

int counter=0;

for (int j = 0;j<matrix[i].length;j++){

if(matrix[i][j]==matrix[i][0])

counter++;

}

if(counter==matrix.length)

result++;

}

return result;

}

public static void main(String[] args) {

//Ex 1

System.out.println("Enter array's size and elements");

int[] dataArray=readArray();

System.out.println("number of paired items in array "+numOfPaired(dataArray));

System.out.println("max value by abs "+maxAbs(dataArray));

System.out.println("mean of array's elements "+mean(dataArray));

System.out.println("sum of element that multiplied by 3 "+sumOfElMyltByThree(dataArray));

System.out.println("difference between min and max element in array "+diffMinMax(dataArray));

System.out.println("sum of the largest and the smallest elements in array "+sumLargAndSmall(dataArray));

//Ex2

int[][] matrix = genereteMatrix();

showMatrix(matrix);

System.out.println("\n sum of the elements located behind the first negative element ");

showArray(excersiceA(matrix));

System.out.println("sum of the elements preceding the last negative element ");

showArray(excersiceB(matrix));

System.out.println("number of lines all elements of which are zeros "+excersiceC(matrix));

System.out.println("number of lines the elements in each of them are the same. "+excersiceD(matrix));

}

}

Висновок: виконуючи цю лабораторну роботу я закріпив знання масивів.