Exercise – Arrays

Write the methods for following common operations on 2D Arrays

1. Initialize the array with user input
2. Initialize the array with random values
3. Printing the content of array
4. Randomly shuffle elements of array
5. Find the largest element and its index
6. Summing all the elements
7. Find the row with the largest sum
8. Summing elements by columns

Write a method that sums all the numbers in the major diagonal in an n * n matrix of double values using the following header:

public static double sumMajorDiagonal(double[][] m)

Write a test program that reads a 4-by-4 matrix and displays the sum of all its elements on the major diagonal. Here is a sample run:

```
Enter a 4-by-4 matrix row by row:
1 2 3 4.0 Enter
5 6.5 7 8 Enter
9 10 11 12 Enter
13 14 15 16 Enter
Sum of the elements in the major diagonal is 34.5
```

Write a method that returns the sum of all the elements in a specified column in a matrix using the following header:

public static double sumColumn(double[][] m, int columnIndex)

Write a test program that reads a 3-by-4 matrix and displays the sum of each column. Here is a sample run:

```
Enter a 3-by-4 matrix row by row:
1.5 2 3 4 Enter
5.5 6 7 8 Enter
9.5 1 3 1 Enter
Sum of the elements at column 0 is 16.5
Sum of the elements at column 1 is 9.0
Sum of the elements at column 2 is 13.0
Sum of the elements at column 3 is 13.0
```

Write a program that randomly fills in 0s and 1s into a 4-by-4 matrix, prints the matrix, and finds the first row and column with the most 1s. Here is a sample run of the program

0 0 1 1
0 0 1 1
1 1 0 1
1 0 1 0
The largest row index: 2
The largest column index: 2

Write a method to multiply two matrices. The header of the method is:

public static double[][]multiplyMatrix(double[][] a, double[][] b)

Write a method to add two matrices. The header of the method is:

public static double[][] addMatrix(double[][] a, double[][] b)