

# Lab: Multidimensional Arrays

Problems for exercises and homework for the ["CSharp Advanced" course @ Software University](#).

You can check your solutions in [Judge](#).

## 1. Sum Matrix Elements

Write a program that **reads a matrix** from the console and prints:

- Count of **rows**
- Count of **columns**
- Sum of all **matrix elements**

On the first line, you will get matrix sizes in format [**rows**, **columns**]

### Examples

Input	Output
3, 6	
7, 1, 3, 3, 2, 1	3
1, 3, 9, 8, 5, 6	6
4, 6, 7, 9, 1, 0	76

### Hints

- On the next [**rows**] lines you will get elements for each column separated with coma and whitespace
- Try to use only **foreach** for printing

## 2. Sum Matrix Columns

Create a program that **reads a matrix** from the console and prints the sum for each column. On the first line, you will get matrix **rows**. On the next **rows** lines, you will get elements for each column separated with a space.

### Examples

Input	Output
3, 6	12
7 1 3 3 2 1	10
1 3 9 8 5 6	19
4 6 7 9 1 0	20
	8
	7
3, 3	12
1 2 3	15
4 5 6	18
7 8 9	

## Hints

- Read matrix sizes.
- On the next row, lines read the columns.
- Traverse the matrix and sum all elements in each column.
- Print the sum and continue with the other columns.

## 3. Primary Diagonal

Create a program that finds the **sum of matrix primary diagonal**.

	0	1	2
0	11	2	4
1	4	5	6
2	10	8	-12

primary diagonal  
sum = 11 + 5 - 12 = 4

## Input

- On the **first line**, you are given the integer **N** – the size of the square matrix
- The next **N lines** hold the values for **every row** – **N** numbers separated by a space

## Examples

Input	Output
3 11 2 4 4 5 6 10 8 -12	4
3 1 2 3 4 5 6 7 8 9	15

## 4. Symbol in Matrix

Create a program that reads **N**, a number representing **rows** and **cols** of a **matrix**. On the next **N** lines, you will receive rows of the matrix. Each row consists of ASCII characters. After that, you will receive a symbol. Find the **first occurrence** of that symbol in the matrix and print its position in the format: "**{row}, {col}**". If there is no such symbol print an error message "**{symbol} does not occur in the matrix**".

## Examples

Input	Output
3 ABC DEF X!@ !	(2, 1)
4 asdd xczc qwee qefw 4	4 does not occur in the matrix

## 5. Square with Maximum Sum

Create a program that **reads a matrix** from the console. Then find the biggest sum of the **2x2 submatrix** and print it to the console.

On the first line, you will get matrix sizes in format **rows, columns**.

In the lines of One next row, you will get elements for each **column** separated with a comma.

Print the **biggest top-left** square, which you find, and the sum of its elements.

## Examples

Input	Output
3, 6 7, 1, 3, 3, 2, 1 1, 3, 9, 8, 5, 6 4, 6, 7, 9, 1, 0	9 8 7 9 33
2, 4 10, 11, 12, 13 14, 15, 16, 17	12 13 16 17 58

## Hints

- Think about `IndexOutOfRangeException()`
- If you find more than one max square, print the top-left one

## 6. Jagged-Array Modification

Create a program that **reads a matrix** from the console. On the first line, you will get matrix **rows**. On the next **rows** lines, you will get elements for each **column** separated with **space**. You will be receiving commands in the following format:

- **Add {row} {col} {value}** – Increase the number at the given **coordinates** with the **value**.
- **Subtract {row} {col} {value}** – Decrease the number at the given **coordinates** by the **value**.

Coordinates might be invalid. In this case, you should print **"Invalid coordinates"**. When you receive **"END"** you should print the matrix and stop the program.

## Examples

Input	Output
3 1 2 3 4 5 6 7 8 9 Add 0 0 5 Subtract 1 1 2 END	6 2 3 4 3 6 7 8 9
4 1 2 3 4 5 6 7 8 8 7 6 5 4 3 2 1 Add 4 4 100 Add 3 3 100 Subtract -1 -1 42 Subtract 0 0 42 END	Invalid coordinates Invalid coordinates -41 2 3 4 5 6 7 8 8 7 6 5 4 3 2 101

## 7. Pascal Triangle

The triangle may be constructed in the following manner: In row 0 (the topmost row), there is a unique nonzero entry 1. Each entry of each subsequent row is constructed by adding the number above and to the left with the number above and to the right, treating blank entries as 0. For example, the initial number in the first (or any other) row is 1 (the sum of 0 and 1), whereas the numbers 1 and 3 in the third row are added to produce the number 4 in the fourth row.

If you want more info about Pascal's triangle [here](#).

Print each row element separated with whitespace.

## Examples

Input	Output
4	1 1 1 1 2 1 1 3 3 1
13	1 1 1 1 2 1 1 3 3 1 1 4 6 4 1 1 5 10 10 5 1

	1	6	15	20	15	6	1						
	1	7	21	35	35	21	7	1					
	1	8	28	56	70	56	28	8	1				
	1	9	36	84	126	126	84	36	9	1			
	1	10	45	120	210	252	210	120	45	10	1		
	1	11	55	165	330	462	462	330	165	55	11	1	
	1	12	66	220	495	792	924	792	495	220	66	12	1

## Hints

- The input number **n** will be **1 <= n <= 60**
- Think about the proper **type** for elements in the array
- Don't be scared to use **more and more arrays**