# Exercise: Arrays

Problems for exercise and homework for the ["C# Fundamentals" course @ SoftUni](https://softuni.bg/trainings/3836/programming-fundamentals-with-csharp-september-2022)  
You can check your solutions in [Judge](https://judge.softuni.org/Contests/1206/Arrays-Exercise)

## Train

### A train has n number of wagons (integer, received as input). On the next n lines, you will receive the number of people that are going to get on each wagon. Print out the number of passengers in each wagon followed by the total number of passengers on the train.

using System;

namespace \_01.\_Train

{

class Program

{

static void Main(string[] args)

{

int n = int.Parse(Console.ReadLine());

int[] numbers = new int[n];

int sum = 0;

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

{

numbers[i] = int.Parse(Console.ReadLine());

sum += numbers[i];

}

foreach (var num in numbers)

{

Console.Write(num+" ");

}

Console.WriteLine(" ");

Console.WriteLine(sum);

}

}

}

### Examples

|  |  |
| --- | --- |
| **Input** | **Output** |
| 3  13  24  8 | 13 24 8  45 |
| 6  3  52  71  13  65  4 | 3 52 71 13 65 4  208 |
| 1  100 | 100  100 |

## Common Elements

### Create a program that prints out all common elements in two arrays. You have to compare the elements of the second array to the elements of the first.

using System;

using System.Linq;

namespace \_02.\_Common\_Elements

{

class Program

{

static void Main(string[] args)

{

string[] firstArr = Console.ReadLine()

.Split(" ");

string[] secondArr = Console.ReadLine()

.Split(" ");

for (int i = 0; i < secondArr.Length; i++)

{

for (int j= 0; j< firstArr.Length; j++)

{

if(secondArr[i]==firstArr[j])

{ Console.Write(secondArr[i]+" "); }

}

}

}

}

}

### Examples

|  |  |
| --- | --- |
| **Input** | **Output** |
| Hey hello 2 4  10 hey 4 hello | 4 hello |
| S of t un i  of i 10 un | of i un |
| i love to code  code i love to | code i love to |

## Zig-Zag Arrays

### Create a program that creates 2 arrays. You will be given an integer n. On the next n lines, you will get 2 integers. Form 2 new arrays in a zig-zag pattern as shown below.

### Examples

|  |  |
| --- | --- |
| **Input** | **Output** |
| 4  1 5  9 10  31 81  41 20 | 1 10 31 20  5 9 81 41 |
| 2  80 23  31 19 | 80 19  23 31 |

## Array Rotation

### Create a program that receives an array and several rotations that you have to perform. The rotations are done by moving the first element of the array from the front to the back. Print the resulting array.

using System;

using System.Linq;

namespace \_04.\_Array\_Rotation

{

class Program

{

static void Main(string[] args)

{

int[] arr = Console.ReadLine()

.Split(" ")

.Select(int.Parse)

.ToArray();

int rotations = int.Parse(Console.ReadLine());

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

{

int firstEl = arr[0];

for (int i = 1; i < arr.Length; i++)

{

arr[i - 1] = arr[i];

}

arr[arr.Length - 1] = firstEl;

}

Console.WriteLine(string.Join(" ",arr));

}

}

}

### Examples

|  |  |
| --- | --- |
| **Input** | **Output** |
| 51 47 32 61 21  2 | 32 61 21 51 47 |
| 32 21 61 1  4 | 32 21 61 1 |
| 2 4 15 31  5 | 4 15 31 2 |

## Top Integers

### Create a program to find all the top integers in an array. A top integer is an integer that is greater than all the elements to its right.

using System;

using System.Linq;

namespace \_05.\_Top\_Integers

{

class Program

{

static void Main(string[] args)

{

int[] numbers = Console.ReadLine()

.Split(" ")

.Select(int.Parse)

.ToArray();

for (int i = 0; i <numbers.Length; i++)

{

bool isBigger = false;

for (int j= i+1; j < numbers.Length; j++)

{

if(numbers[i]>numbers[j])

{ isBigger = true; }

else

{

isBigger = false;

break ;

}

}

if(isBigger)

{ Console.Write(numbers[i]+" "); }

}

Console.Write(numbers[numbers.Length-1]);

}

}

}

### Examples

|  |  |
| --- | --- |
| **Input** | **Output** |
| 1 4 3 2 | 4 3 2 |
| 14 24 3 19 15 17 | 24 19 17 |
| 27 19 42 2 13 45 48 | 48 |

## Equal Sums

### Create a program that determines if an element exists in an array for which the sum of all elements to its left is equal to the sum of all elements to its right. If there are no elements to the left or right, their sum is considered to be 0. Print the index of the element that satisfies the condition or "no" if there is no such element.

using System;

using System.Linq;

namespace \_06.\_Equal\_Sum

{

class Program

{

static void Main(string[] args)

{

int[] numbers = Console.ReadLine()

.Split(" ")

.Select(int.Parse)

.ToArray();

int index = 0;

bool sameSums = false;

for (int i = 0; i < numbers.Length; i++)

{

int sumLeft = 0, sumRight = 0;

for (int j = i + 1; j < numbers.Length; j++)

{

sumRight += numbers[j];

}

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

{

sumLeft += numbers[k];

}

if (sumLeft==sumRight)

{

sameSums = true;

index = i;

}

}

if(sameSums)

{ Console.WriteLine(index); }

else

{ Console.WriteLine("no"); }

}

}

}

### Examples

|  |  |  |
| --- | --- | --- |
| **Input** | **Output** | **Comments** |
| 1 2 3 3 | 2 | At a[2] -> left sum = 3, right sum = 3  a[0] + a[1] = a[3] |
| 1 2 | no | At a[0] -> left sum = 0, right sum = 2  At a[1] -> left sum = 1, right sum = 0  No such index exists |
| 1 | 0 | At a[0] -> left sum = 0, right sum = 0 |
| 1 2 3 | no | No such index exists |
| 10 5 5 99 3 4 2 5 1 1 4 | 3 | At a[3] -> left sum = 20, right sum = 20  a[0] + a[1] + a[2] = a[4] + a[5] + a[6] + a[7] + a[8] + a[9] + a[10] |

## Max Sequence of Equal Elements

### Create a program that finds the longest sequence of equal elements in an array of integers. If several equal sequences are present in the array, print out the leftmost one.

using System;

using System.Linq;

namespace \_07.\_Max\_Sequence\_of\_Equal\_Elements

{

class Program

{

static void Main(string[] args)

{

int[] numbers = Console.ReadLine()

.Split(" ")

.Select(int.Parse)

.ToArray();

int maxBr = 0,maxNum=0;

for (int i = numbers.Length-1; i >=0; i--)

{

int currentBr = 1;

for (int j = i-1; j >=0; j--)

{

if(numbers[i]==numbers[j])

{ currentBr++; }

else

{ break; }

}

if(currentBr>=maxBr)

{

maxNum = numbers[i];

maxBr = currentBr;

}

}

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

{

Console.Write(maxNum+" ");

}

}

}

}

### Examples

|  |  |
| --- | --- |
| **Input** | **Output** |
| 2 1 1 2 3 3 **2 2 2** 1 | 2 2 2 |
| **1 1 1** 2 3 1 3 3 | 1 1 1 |
| **4 4 4 4** | 4 4 4 4 |
| 0 **1 1** 5 2 2 6 3 3 | 1 1 |

## Magic Sum

### Create a program, which prints all unique pairs in an array of integers whose sum is equal to a given number.

using System;

using System.Linq;

namespace \_08.\_Magic\_Sum

{

class Program

{

static void Main(string[] args)

{

int[] numbers = Console.ReadLine()

.Split(" ")

.Select(int.Parse)

.ToArray();

int magicNum = int.Parse(Console.ReadLine());

int []magicNums=new int[2];

for (int i = 0; i < numbers.Length; i++)

{

int sum = 0;

bool isUnique = false;

for (int j = i + 1; j < numbers.Length; j++)

{

sum = 0;

sum += numbers[i];

sum += numbers[j];

if(sum==magicNum)

{

magicNums[0] = numbers[i];

magicNums[1] = numbers[j];

isUnique = true;

break;

}

}

if (isUnique)

{ Console.WriteLine(string.Join(" ", magicNums)); }

}

}

}

}

### Examples

|  |  |
| --- | --- |
| **Input** | **Output** |
| 1 7 6 2 19 23  8 | 1 7  6 2 |
| 14 20 60 13 7 19 8  27 | 14 13  20 7  19 8 |

## \*Kamino Factory

The clone factory in Kamino got another order to clone troops. But this time you are tasked to find **the best DNA** sequence to use in the production.

You will receive the **DNA length** and until you receive the command "**Clone them!**", you will be receiving a **DNA sequence of ones and zeroes, split by** '**!**' **(one or several).**

You should select the sequence with the **longest subsequence of ones**. If there are several sequences with the **same length of** the **subsequence of ones**, print the one with the **leftmost** **starting index**, if there are several sequences with the same **length and starting index**, select the sequence with the **greater sum** of its elements.

After you receive the last command "Clone them!" you should print the collected information in the following format:

"Best DNA sample {bestSequenceIndex} with sum: {bestSequenceSum}."

"{DNA sequence, joined by space}"

using System;

using System.Linq;

namespace \_09.\_Kamino\_Factory

{

class Program

{

static void Main(string[] args)

{

int sequenceLength = int.Parse(Console.ReadLine());

string input;

int maxBr=0, currentBr = 0, maxIndex=0,currentSum=0,maxSum=0,arrIndex=0,maxArrIndex=0;

int[] bestSequence = new int[sequenceLength];

while ((input = Console.ReadLine()) != "Clone them!")

{

arrIndex++;

currentBr = 0;

currentSum = 0;

int[] sequence = input

.Split('!',StringSplitOptions.RemoveEmptyEntries)

.Select(int.Parse)

.ToArray();

for (int k = 0; k < sequence.Length; k++)

{

currentSum += sequence[k];

}

for (int i = 0; i < sequence.Length; i++)

{

currentBr = 0;

for (int j = i + 1; j < sequence.Length; j++)

{

if (sequence[i]== sequence[j])

{

currentBr++;

}

else

{

break;

}

}

if (currentBr > maxBr)

{

maxBr = currentBr;

maxIndex = i;

maxSum = currentSum;

maxArrIndex = arrIndex;

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

{

bestSequence[j] = sequence[j];

}

}

else if(currentBr==maxBr)

{

if(maxIndex>i)

{

maxBr = currentBr;

maxSum = currentSum;

maxIndex = i;

maxArrIndex = arrIndex;

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

{

bestSequence[j] = sequence[j];

}

}

else if(maxIndex==i)

{

if(currentSum>maxSum)

{

maxBr = currentBr;

maxSum = currentSum;

maxIndex = i;

maxArrIndex = arrIndex;

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

{

bestSequence[j] = sequence[j];

}

}

}

}

}

}

Console.WriteLine($"Best DNA sample {maxArrIndex} with sum: {maxSum}.");

Console.WriteLine(string.Join(" ",bestSequence));

}

}

}

### Input / Constraints

* The **first line** holds the **length** of the **sequences** – **integer in the range [1…100].**
* On the next lines, until you receive **"Clone them!",** you will be receiving sequences (at least one) of ones and zeroes, **split by** '**!**' (one or several).

### Output

The output should be printed on the console and consists of two lines in the following format:

"Best DNA sample {bestSequenceIndex} with sum: {bestSequenceSum}."

"{DNA sequence, joined by space}"

### Examples

|  |  |  |
| --- | --- | --- |
| **Input** | **Output** | **Comments** |
| 5  1!0!**1!1**!0  0!**1!1**!0!0  Clone them! | Best DNA sample 2 with sum: 2.  0 1 1 0 0 | We receive 2 sequences with the **same length** **of the subsequence of ones**, but the second is printed because its subsequence starts at **index[1]**. |
| **Input** | **Output** | **Comments** |
| 4  **1!1**!0!**1**  1!0!0!1  **1!1**!0!0  Clone them! | Best DNA sample 1 with sum: 3.  1 1 0 1 | We receive 3 sequences. Both 1 and 3 **have the same length** of the subsequence of ones -> 2, **and both start from the index[0]**, but the first is printed, because its **sum is greater.** |

## \*LadyBugs

You are given a **field size** and the **indexes where ladybugs** can be found on the field. On every new line, until the "**end**" command is given, a ladybug **changes its position** either to its **left** or to its **right** by a given **fly length**. A movement description **command** looks like this: "0 right 1". This means that the little insect **placed on index 0 should fly one index to its right**. If the ladybug **lands on another ladybug**, it **continues to fly in the same direction repeating the specified flight length**. If the ladybug **flies out of the field**, it is **gone**.

For example, you are given a **field of size 3**, where there are ladybugs on indexes **0 and 1**. If the ladybug **on index 0 needs to fly to its right by the length of 1** (0 right 1), it will attempt to **land on index 1** but as there is **another ladybug** there, it will continue further to the right passing 1 index in length, landing on **index 2**. After that, if the same ladybug needs to fly to its right passing 1 index (2 right 1), it will land somewhere **outside** of the field, so it flies **away**:



### If we receive an initial index that does not contain a ladybug, nothing happens. If you are given a ladybug index that is outside the field, nothing happens. In the end, print all cells of the field separated by blank spaces. For each cell that has a ladybug in it print '1' and for each empty cell print '0'. The output of the example above should be "0 1 0".

using System;

using System.Linq;

namespace \_10.\_LadyBugs

{

class Program

{

static void Main(string[] args)

{

int n = int.Parse(Console.ReadLine());

int[] field = new int[n];

int[] initialIndexes = Console.ReadLine()

.Split(" ",StringSplitOptions.RemoveEmptyEntries)

.Select(int.Parse)

.ToArray();

foreach (int index in initialIndexes)

{

if(index>=0&&index<field.Length)

{

field[index] = 1;

}

}

string command;

while ((command=Console.ReadLine())!="end")

{

string[] cmd = command

.Split(" ", StringSplitOptions.RemoveEmptyEntries);

int ladybugsIndex = int.Parse(cmd[0]);

string direction = cmd[1];

int flyLength = int.Parse(cmd[2]);

if(ladybugsIndex<0||ladybugsIndex>=field.Length)

{

continue;

}

if(field[ladybugsIndex]==0)

{

continue;

}

field[ladybugsIndex] = 0;

if(direction=="left")

{

flyLength \*= -1;

}

int nextIndex = ladybugsIndex + flyLength;

while(nextIndex>=0&&nextIndex<field.Length&&field[nextIndex]==1)

{

nextIndex += flyLength;

}

if(nextIndex<0||nextIndex>=field.Length)

{

continue;

}

field[nextIndex] = 1;

}

Console.WriteLine(string.Join(" ",field));

}

}

}

### Input

* On the first line, you will receive an integer - the size of the field.
* On the second line, you will receive the initial indexes of all ladybugs separated by a blank space.
* On the next lines, until you get the "**end**" command, you will receive commands in the format: **"{ladybug index} {direction} {fly length}**".

### Output

* Print all field cells in format: "**{cell} {cell} … {cell}**"
  + If a cell has a ladybug in it, print '1'.
  + If a cell is empty, print '0'.

### Constrains

* The size of the field will be in the range [0…1000].
* The ladybug indexes will be in the range [-2147483647…2147483647].
* The number of commands will be in the range [0…100].
* The fly length will be in the range [-2147483647…2147483647].

### Examples

|  |  |  |
| --- | --- | --- |
| **Input** | **Output** | **Comments** |
| 3  0 1  0 right 1  2 right 1  end | 0 1 0 | 1 1 0 - initial field  0 1 1 - field after "0 right 1"  0 1 0 - field after "2 right 1" |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Input** | **Output** |  | **Input** | **Output** |
| 3  0 1 2  0 right 1  1 right 1  2 right 1  end | 0 0 0 |  | 5  3  3 left 2  1 left -2  end | 0 0 0 1 0 |