# Exercise: Methods

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/1209/Methods-Exercise)

## Smallest of Three Numbers

Create a method that **prints out the smallest of three integer numbers**.

using System;

namespace \_01.\_Smallest\_of\_Three\_Numbers

{

class Program

{

static void Main(string[] args)

{

int[] arr = new int[3];

for (int i = 0; i < 3; i++)

{

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

}

Console.WriteLine(minNumber(arr));

}

static int minNumber(int[] arr)

{

int minNum = Int32.MaxValue;

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

{

if (arr[i]< minNum)

{ minNum = arr[i]; }

}

return minNum;

}

}

}

### Examples

|  |  |
| --- | --- |
| **Input** | **Output** |
| 2  5  3 | 2 |
| 600  342  123 | 123 |
| 25  21  4 | 4 |

## Vowels Count

Create a method that receives a **single string** and **prints out the number of vowels** contained in it.

using System;

namespace \_02.\_Vowels\_Count

{

class Program

{

static void Main(string[] args)

{

string text = Console.ReadLine();

Console.WriteLine(numberOfVowels(text));

}

private static int numberOfVowels(string a)

{

int br = 0;

foreach (char letter in a.ToLower())

{

if(letter=='a'|| letter == 'u'|| letter == 'y'|| letter =='e'|| letter == 'o'|| letter == 'i')

{

br++;

}

}

return br;

}

}

}

### Examples

|  |  |
| --- | --- |
| **Input** | **Output** |
| SoftUni | 3 |
| Cats | 1 |
| JS | 0 |

## Characters in Range

Create a method that receives **two characters** and prints all the **characters between them according to ASCII** (on a single line).

**NOTE:** If the second letter's ASCII value is less than that of the first one, then the two initial letters should be swapped.

using System;

namespace \_03.\_Characters\_in\_Range

{

class Program

{

static void Main(string[] args)

{

char firstChar = char.Parse(Console.ReadLine());

char secondChar = char.Parse(Console.ReadLine());

CharactersInRange(firstChar, secondChar);

}

private static void CharactersInRange(char firstChar, char secondChar)

{

char swap;

if((int)secondChar<(int)firstChar)

{

swap = firstChar;

firstChar = secondChar;

secondChar = swap;

}

for (int i = (int)firstChar+1; i < (int)secondChar; i++)

{

Console.Write((char)i+" ");

}

}

}

}

### Examples

|  |  |
| --- | --- |
| **Input** | **Output** |
| a  d | b c |
| #  : | $ % & ' ( ) \* + , - . / 0 1 2 3 4 5 6 7 8 9 |
| C  # | $ % & ' ( ) \* + , - . / 0 1 2 3 4 5 6 7 8 9 : ; < = > ? @ A B |

## Password Validator

Create a program that checks if a given password is **valid**.

The password validation **rules** are:

* It should contain **6 – 10 characters (inclusive)**
* It should contain **only letters and digits**
* It should contain **at least 2 digits**

If it is **not valid**, for any unfulfilled rule **print the corresponding message**:

* "**Password must be between 6 and 10 characters**"
* "**Password must consist only of letters and digits**"
* "**Password must have at least 2 digits**"

using System;

namespace \_04.\_Password\_Validator

{

class Program

{

static void Main(string[] args)

{

string password = Console.ReadLine();

int br = 0;

if (passwordLength(password))

{ br++; }

else

{ Console.WriteLine("Password must be between 6 and 10 characters"); }

if (passwordContain(password))

{ br++; }

else

{ Console.WriteLine("Password must consist only of letters and digits"); }

if (passwordDigits(password))

{br++;}

else

{ Console.WriteLine("Password must have at least 2 digits"); }

if(br==3)

{ Console.WriteLine("Password is valid"); }

}

static bool passwordLength(string a)

{

if(a.Length>=6&&a.Length<=10)

{ return true; }

return false;

}

static bool passwordContain(string a)

{

foreach (char letter in a)

{

if(!( ((int)letter>=48&&(int)letter<=57) || ((int)letter >= 65 && (int)letter <= 90) || ((int)letter >= 97 && (int)letter <= 122) ))

{ return false; }

}

return true;

}

static bool passwordDigits(string a)

{

int br = 0;

foreach (char letter in a)

{

if (((int)letter >= 48 && (int)letter <= 57))

{ br++; }

}

if (br >= 2)

{ return true; }

return false;

}

}

}

### Examples

|  |  |
| --- | --- |
| **Input** | **Output** |
| logIn | Password must be between 6 and 10 characters  Password must have at least 2 digits |
| MyPass123 | Password is valid |
| Pa$s$s | Password must consist only of letters and digits  Password must have at least 2 digits |

### Hints

Write a method for each rule.

## Add and Subtract

### You will receive 3 integers. Create a method that returns the sum of the first two integers and another method that subtracts the third integer from the result of the sum method.

using System;

namespace \_05.\_Add\_and\_Subtract

{

class Program

{

static void Main(string[] args)

{

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

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

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

Console.WriteLine(calculations(a, b, c));

}

private static int calculations(int a, int b, int c)

{

return a + b - c;

}

}

}

### Examples

|  |  |
| --- | --- |
| **Input** | **Output** |
| 23  6  10 | 19 |
| 1  17  30 | -12 |
| 42  58  100 | 0 |

## Middle Characters

You will receive a single string. Create a method that **prints the character found at its middle**. If the **length** of the string is **even**, there are **two middle characters**.

using System;

namespace \_06.\_Middle\_Characters

{

class Program

{

static void Main(string[] args)

{

string input = Console.ReadLine();

middleLetters(input);

}

private static void middleLetters(string input)

{

if(input.Length%2!=0)

{ Console.WriteLine(input[input.Length/2]); }

else

{ Console.WriteLine($"{input[input.Length / 2-1]}{input[input.Length / 2]}"); }

}

}

}

### Examples

|  |  |
| --- | --- |
| **Input** | **Output** |
| aString | r |
| someText | eT |
| 3245 | 24 |

## NxN Matrix

Create a method that receives a single integer **n** and prints an **NxN** matrix using this number as a filler.

using System;

namespace \_07.\_NxN\_Matrix

{

class Program

{

static void Main(string[] args)

{

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

matrix(n);

}

private static void matrix(int n)

{

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

{

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

{

Console.Write($"{n} ");

}

Console.WriteLine(" ");

}

}

}

}

### Examples

|  |  |
| --- | --- |
| **Input** | **Output** |
| 3 | 3 3 3  3 3 3  3 3 3 |
| 7 | 7 7 7 7 7 7 7  7 7 7 7 7 7 7  7 7 7 7 7 7 7  7 7 7 7 7 7 7  7 7 7 7 7 7 7  7 7 7 7 7 7 7  7 7 7 7 7 7 7 |
| 2 | 2 2  2 2 |

## Factorial Division

Read **two integers**. Calculate the [factorial](https://en.wikipedia.org/wiki/Factorial) of each number. **Divide the first result by the second** and print the result of the division **formatted to the second decimal point**.

using System;

namespace \_08.\_Factorial\_Division

{

class Program

{

static void Main(string[] args)

{

double firstNumber = double.Parse(Console.ReadLine());

double secondNumber= double.Parse(Console.ReadLine());

Console.WriteLine($"{(factroriel(firstNumber)/factroriel(secondNumber)):f2}");

}

private static double factroriel(double firstNumber)

{

double factoriel = 1;

for (int i =(int) firstNumber; i > 0; i--)

{

factoriel \*= i;

}

return factoriel;

}

}

}

### Examples

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Input** | **Output** |  | **Input** | **Output** |
| 5  2 | 60.00 |  | 6  2 | 360.00 |

## Palindrome Integers

Create a program that reads positive integers **until you receive** the "**END**" command. For each number, **print whether the number is a palindrome or not**. A palindrome is a number that reads the same backward as forward, such as 323 or 1001.

using System;

namespace \_09.\_Palindrome\_Integers

{

class Program

{

static void Main(string[] args)

{

string input = Console.ReadLine();

while (input != "END")

{

if (palindrome(input))

{ Console.WriteLine("true"); }

else

{ Console.WriteLine("false"); }

input = Console.ReadLine();

}

}

private static bool palindrome(string input)

{

bool flag = true ;

for (int i = 0; i < input.Length/2; i++)

{

if(input[i]==input[input.Length-1-i])

{

flag= true;

}

else

{

flag=false;

break;

}

}

return flag;

}

}

}

### Examples

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Input** | **Output** |  | **Input** | **Output** |
| 123  323  421  121  END | false  true  false  true |  | 32  2  232  1010  END | false  true  true  false |

## Top Number

A **top number** is an integer that holds the following properties:

* Its sum of digits is divisible by 8, e.g. 8, 17, 88
* Holds at least one odd digit, e.g. 232, 707, 87578
* Some examples of top numbers are: 17, 161, 251, 4310, 123200

Create a program to print all top numbers in the range [1…n].

You will receive a single integer from the console, representing the end value.

using System;

namespace \_10.\_Top\_Number

{

class Program

{

static void Main(string[] args)

{

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

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

{

isTopNumber(i);

}

}

private static void isTopNumber(int n)

{

int sum = 0;

int br = 0;

int currentNumber = n;

while(n!=0)

{

int currentDigit = n % 10;

sum += currentDigit;

if(currentDigit%2!=0)

{ br++; }

n /= 10;

}

if (sum % 8 == 0 && br >= 1)

{ Console.WriteLine(currentNumber); }

else

{ Console.Write(""); }

}

}

}

### Examples

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Input** | **Output** |  | **Input** | **Output** |
| 50 | 17  35 |  | 100 | 17  35  53  71  79  97 |

## \*Array Manipulator

Peter has finally become a junior developer and has received his first task. It's about manipulating an array of integers. He is not quite happy about it, since he hates manipulating arrays. They are going to pay him a lot of money, though, and he is willing to give somebody half of it if they help him do his job. You, on the other hand, love arrays (and money), so you decide to try your luck.

The array may be manipulated by one of the following commands

* **exchange {index}** – splits the array **after** the given index and exchanges the places of the two resulting sub-arrays. E.g. [1, 2, 3, 4, 5] -> exchange 2 -> result: [4, 5, 1, 2, 3]
  + If the index is outside the boundaries of the array, print "**Invalid index**"
* **max** **even/odd** – returns the **INDEX** of the max even/odd element -> [1, 4, 8, 2, 3] -> **max odd** -> print **4**
* **min** **even/odd** – returns the **INDEX** of the min even/odd element -> [1, 4, 8, 2, 3] -> **min even** > print **3**
  + If there are two or more equal **min/max** elements, return the index of the **rightmost** one
  + If a **min/max even/odd** element **cannot** be found, print "**No matches**"
* **first {count}** **even/odd** – returns the first {count} elements -> [1, 8, 2, 3] -> **first 2 even** -> print **[8, 2]**
* **last {count}** **even/odd** – returns the last {count} elements -> [1, 8, 2, 3] -> **last 2 odd** -> print **[1, 3]**
  + If the count is greater than the array length, print "**Invalid count**"
  + If there are **not** **enough** elements to satisfy the count, print as many as you can. If there are **zero** **even/odd** elements, print an empty array "[]"
* **end** – stop taking input and print the final state of the array

### Input

* The input data should be read from the console.
* On the first line, the initial array is received as a line of integers, separated by a single space.
* On the next lines, until the command "**end**" is received, you will receive the array manipulation commands.
* The input data will always be valid and in the format described. There is no need to check it explicitly.

### Output

* The output should be printed on the console.
* On a separate line, print the output of the corresponding command.
* On the last line print the final array in **square brackets** with its elements separated by a comma and a space .
* See the examples below to get a better understanding of your task.

### Constraints

* The **number of input lines** will be in the range [2…50].
* The **array elements** will be integers in the range [0…1000].
* The **number of elements** will be in the range [1…50].
* The **split index** will be an integer in the range [-231…231 – 1].
* **The first/last count** will be an integer in the range [1…231 – 1].
* There will **not** be redundant whitespace anywhere in the input.
* Allowed working time for your program: 0.1 seconds. Allowed memory: 16 MB.

using System;

using System.Linq;

namespace \_11.\_Array\_Manipulator

{

class Program

{

static void Main(string[] args)

{

int[] arr = Console.ReadLine()

.Split(" ")

.Select(int.Parse)

.ToArray();

string command;

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

{

string[] cmdArgs = command

.Split(' ');

string cmdType = cmdArgs[0];

if (cmdType == "exchange")

{

int index = int.Parse(cmdArgs[1]);

if (index < 0 || index >= arr.Length)

{

Console.WriteLine("Invalid index");

continue;

}

arr = ExchangeArray(arr, index);

}

else if (cmdType == "max")

{

string evenOrOddArg = cmdArgs[1];

int indexOfMaxEl = IndexOfMaxEvenOrOddEllement(arr, evenOrOddArg);

if(indexOfMaxEl==-1)

{

Console.WriteLine("No matches");

continue;

}

Console.WriteLine(indexOfMaxEl);

}

else if (cmdType == "min")

{

string evenOrOddArg = cmdArgs[1];

int indexOfMinEl = IndexOfMinEvenOrOddEllement(arr, evenOrOddArg);

if (indexOfMinEl == -1)

{

Console.WriteLine("No matches");

continue;

}

Console.WriteLine(indexOfMinEl);

}

else if(cmdType=="first"||cmdType=="last")

{

int count = int.Parse(cmdArgs[1]);

string evenOrOddArg = cmdArgs[2];

if(count>arr.Length)

{

Console.WriteLine("Invalid count");

continue;

}

int[] elements;

if(cmdType=="first")

{

elements = FirstEvenOrOddElements(arr, count, evenOrOddArg);

}

else

{ elements = LastEvenOrOddElements(arr, count, evenOrOddArg); }

PrintArray(elements);

}

}

PrintArray(arr);

}

static int[]ExchangeArray(int[]originalArr,int index)

{

int [] modifiedArr = new int[originalArr.Length];

int modifiedArrIndex = 0;

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

{

modifiedArr[modifiedArrIndex] = originalArr[i];

modifiedArrIndex++;

}

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

{

modifiedArr[modifiedArrIndex] = originalArr[i];

modifiedArrIndex++;

}

return modifiedArr;

}

static int IndexOfMaxEvenOrOddEllement(int[]arr,string evenOrOddArg)

{

int maxIndex = -1;

int currMax = int.MinValue;

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

{

int currNum = arr[i];

if (evenOrOddArg=="even"&&currNum%2==0)

{

if (currNum >= currMax)

{

currMax = currNum;

maxIndex = i;

}

}

else if(evenOrOddArg == "odd" && currNum % 2 != 0)

{

if (currNum >= currMax)

{

currMax = currNum;

maxIndex = i;

}

}

}

return maxIndex;

}

static int IndexOfMinEvenOrOddEllement(int[] arr, string evenOrOddArg)

{

int minIndex = -1;

int currMin = int.MaxValue;

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

{

int currNum = arr[i];

if (evenOrOddArg == "even" && currNum % 2 == 0)

{

if (currNum <= currMin)

{

currMin = currNum;

minIndex = i;

}

}

else if (evenOrOddArg == "odd" && currNum % 2 != 0)

{

if (currNum <= currMin)

{

currMin = currNum;

minIndex = i;

}

}

}

return minIndex;

}

static int[] FirstEvenOrOddElements(int[] arr,int count,string evenOrOddArg)

{

int[] firstElArr = new int[count];

int firstElArrIndex = 0;

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

{

if (firstElArrIndex >= count)

{

break;

}

int currNum = arr[i];

if(evenOrOddArg=="even"&&currNum%2==0)

{

firstElArr[firstElArrIndex++] =currNum;

}

else if (evenOrOddArg == "odd" && currNum % 2 != 0)

{

firstElArr[firstElArrIndex++] = currNum;

}

}

firstElArr = ResizeArray(firstElArr, firstElArrIndex);

return firstElArr;

}

static int[] LastEvenOrOddElements(int[] arr, int count, string evenOrOddArg)

{

int[] firstElArr = new int[count];

int firstElArrIndex = 0;

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

{

if (firstElArrIndex >= count)

{

break;

}

int currNum = arr[i];

if (evenOrOddArg == "even" && currNum % 2 == 0)

{

firstElArr[firstElArrIndex++] = currNum;

}

else if (evenOrOddArg == "odd" && currNum % 2 != 0)

{

firstElArr[firstElArrIndex++] = currNum;

}

}

firstElArr = ResizeArray(firstElArr, firstElArrIndex);

firstElArr = ReverseArray(firstElArr);

return firstElArr;

}

static int[]ResizeArray(int[]originalArr,int count)

{

int[] modifiedArray = new int[count];

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

{

modifiedArray[i] = originalArr[i];

}

return modifiedArray;

}

static int[]ReverseArray(int[]originalArray)

{

int[] reversed = new int[originalArray.Length];

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

{

reversed[reversed.Length - i - 1] = originalArray[i];

}

return reversed;

}

static void PrintArray(int[]arr)

{ Console.WriteLine($"[{String.Join(", ",arr)}]"); }

}

}

### Examples

|  |  |
| --- | --- |
| **Input** | **Output** |
| 1 3 5 7 9  exchange 1  max odd  min even  first 2 odd  last 2 even  exchange 3  end | 2  No matches  [5, 7]  []  [3, 5, 7, 9, 1] |
| **Input** | **Output** |
| 1 10 100 1000  max even  first 5 even  exchange 10  min odd  exchange 0  max even  min even  end | 3  Invalid count  Invalid index  0  2  0  [10, 100, 1000, 1] |
| **Input** | **Output** |
| 1 10 100 1000  exchange 3  first 2 odd  last 4 odd  end | [1]  [1]  [1, 10, 100, 1000] |