Lab: Lists

Problems for in-class lab for the "C# Fundamentals" course @ SoftUni
You can check your solutions in Judge

1. Sum Adjacent Equal Numbers

Create a program to **sum all of the adjacent equal numbers** in a list of decimal numbers, starting from **left to right**.

- After two numbers are summed, the result could be equal to some of its neighbors and should be summed as well (see the examples below)
- Always sum the leftmost two equal neighbors (if several couples of equal neighbors are available)

Examples

Input	Output	Explanation
3 3 6 1	12 1	**3 3** 6 1 → **6 6** 1 → 12 1
8 2 2 4 8 16	16 8 16	8 **2 2** 4 8 16 → 8 **4 4** 8 16 → **8 8** 8 16 → 16 8 16
5 4 2 1 1 4	5 8 4	5 4 2 **1 1** 4 → 5 4 **2 2** 4 → 5 **4 4** 4 → 5 8 4

Solution

Read a list of numbers.

```
List<double> numbers = Console.ReadLine()
    .Split()
    .Select(double.Parse)
    .ToList();
```

Iterate through the elements. Check if the number at the **current index** is **equal** to the **next** number. If it is, **aggregate the numbers** and **reset** the loop, otherwise **don't do anything**.

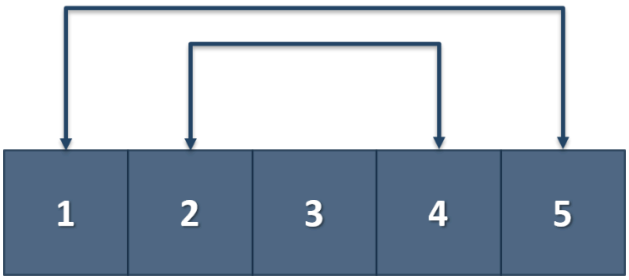
```
if (numbers[i] == numbers[i + 1])
{
    numbers[i] += numbers[i + 1];
    numbers.RemoveAt(i + 1);
    i = -1;
}
```

Finally, you have to print the numbers joined by a single space.

```
Console.WriteLine(string.Join(" ", numbers));
```

2. Gauss' Trick

Create a program that sums all numbers in a list in the following order:
first + last, *first + 1 + last - 1*, *first + 2 + last - 2*, … *first + n*, *last - n*.



Example

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

3. Merging Lists

You are going to receive **two lists** of **numbers**. Create a list that **contains** the **numbers** from **both of the lists**. The **first element** should be from the **first list**, **the second** from the **second list**, and so on. If **the length** of the two lists **is not equal**, just **add the remaining** elements **at the end of the list**.

Example

Input	Output
3 5 2 43 12 3 54 10 23 76 5 34 2 4 12	3 76 5 5 2 34 43 2 12 4 3 12 54 10 23
76 5 34 2 4 12 3 5 2 43 12 3 54 10 23	76 3 5 5 34 2 2 43 4 12 12 3 54 10 23

Hint

- Read the two lists.
- Create a result list.
- Start looping through them until you reach the end of the smallest one.
- Finally, add the remaining elements (if there are any) to the end of the list.

4. List of Products

Read a number **n** and **n lines of products**. Print a **numbered list** of all the products **ordered by name**.

Examples

Input	Output
4 Potatoes Tomatoes Onions Apples	1.Apples 2.Onions 3.Potatoes 4.Tomatoes
5 Carrots Artichokes Beans	1.Artichokes 2.Beans 3.Carrots 4.Eggplants

Eggplants Peppers	5.Peppers

Solution

First, we need to read the number **n** from the console.

```
using System;

class ListOfProducts
{
    static void Main()
    {
        int n = int.Parse(Console.ReadLine());

    }
}
```

Then we need to create our **list of strings**, because the **products are strings.**

```
using System;
using System.Collections.Generic;

class ListOfProducts
{
    static void Main()
    {
        int n = int.Parse(Console.ReadLine());

        List<string> products = new List<string>();

    }
}
```

Then we need to iterate **n times** and **read our current product**.

```
using System;
using System.Collections.Generic;

class ListOfProducts
{
    static void Main()
    {
        int n = int.Parse(Console.ReadLine());

        List<string> products = new List<string>();

        for (int i = 0; i < n; i++)
        {
            string currentProduct = Console.ReadLine();
        }
    }
}
```

The next step is to **add** the current product to the list.

```
static void Main()
{
    int n = int.Parse(Console.ReadLine());

    List<string> products = new List<string>();

    for (int i = 0; i < n; i++)
    {
        string currentProduct = Console.ReadLine();
        products.Add(currentProduct);
    }
}
```

After we finish reading the products, we **sort our list alphabetically.**

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

List<string> products = new List<string>();

for (int i = 0; i < n; i++)
{
    string currentProduct = Console.ReadLine();
    products.Add(currentProduct);
}

products.Sort();
```

- The **sort method** sorts the list in ascending order.

Finally, we have to **print our sorted** list. To do that we **loop through the list**.

```
for (int i = 0; i < products.Count; i++)
{
    Console.WriteLine($"{i + 1}.{products[i]}");
}
```

- We use **`i + 1`** because we want to **start counting from 1**, we put the **'.'**, and **finally,** we put **the actual product.**

5. Remove Negatives and Reverse

Read a **list of integers**, **remove all negative numbers** from it and print the remaining elements in **reversed order**. If there are no elements left in the list, print **`"empty"`**.

Examples

Input	Output
10 -5 7 9 -33 50	50 9 7 10
7 -2 -10 1	1 7
-1 -2 -3	empty

Solution

Read a list of integers.

```
List<int> numbers = Console.ReadLine()
    .Split()
    .Select(int.Parse)
    .ToList();
```

Remove all negative numbers.

```
numbers.RemoveAll(n => n < 0);
```

If the list count is equal to 0, print "empty", otherwise print all numbers joined by space.

```
if (numbers.Count == 0)
{
    Console.WriteLine("empty");
}
else
{
    Console.WriteLine(string.Join(" ", numbers));
}
```

6. List Manipulation Basics

Create a program that reads a list of integers. Then until you receive **"end"**, you will receive different **commands:**

- **Add {number}:** add a number to the end of the list.
- **Remove {number}:** remove a number from the list.
- **RemoveAt {index}:** remove a number at a given index.
- **Insert {number} {index}:** insert a number at a given index.

Note: All the indices will be valid!

When you receive the **"end"** command, print the **final state** of the list (**separated by spaces**).

Example

Input	Output
4 19 2 53 6 43 Add 3 Remove 2 RemoveAt 1 Insert 8 3 end	4 53 6 8 43 3

23 1 456 63 32 87 9 32 Remove 5 Add 1 Insert 14 2 RemoveAt 3 Add 34 end	23 1 14 63 32 87 9 32 1 34

Solution

First let us read the list from the console.

```
using System;
using System.Collections.Generic;
using System.Linq;

class ListManipulationBasics
{
    static void Main()
    {
        List<int> numbers = Console.ReadLine()
            .Split()
            .Select(int.Parse)
            .ToList();

    }
}
```

- We **split** the string we have received from the console, then we **loop through each of the elements** and parse them to **integers.**
- This returns **`IEnumerable<int>`** (a **collection** of integers) and we have to keep it in the form of a list.

Next, we go through the input using a `while` loop and a `switch` case statement for the different commands.

```
List<int> numbers = Console.ReadLine()
    .Split()
    .Select(int.Parse)
    .ToList();

while (true)
{
    string line = Console.ReadLine();

    if (line == "end")
    {
        break;
    }

    string[] tokens = line.Split();
}
```

- We stop the cycle, if the line is ended, otherwise, we **split** the input string into **tokens**.

```
string[] tokens = line.Split();

switch (tokens[0])
{
    case "Add":
        break;
    case "Remove":
        break;
    case "RemoveAt":
        break;
    case "Insert":
        break;
}
```

Now, let us implement **each** of the **commands**.

```
case "Add":
    int numberToAdd = int.Parse(tokens[1]);
    numbers.Add(numberToAdd);
    break;
case "Remove":
    int numberToRemove = int.Parse(tokens[1]);
    numbers.Remove(numberToRemove);
    break;
case "RemoveAt":
    int indexToRemove = int.Parse(tokens[1]);
    numbers.RemoveAt(indexToRemove);
    break;
case "Insert":
    int numberToInsert = int.Parse(tokens[1]);
    int indexToInsert = int.Parse(tokens[2]);
    numbers.Insert(indexToInsert, numberToInsert);
    break;
```

- For each of the commands, **except `"Insert"`, `tokens[1]`** is the **number/index.**
- For the **`"Insert"`** command we receive a **number and an index** (**`tokens[1]`, `tokens[2]`**).

Finally, we **print** the numbers, joined by **a single space.**

```
Console.WriteLine(string.Join(" ", numbers));
```

7. List Manipulation Advanced

Next, we are going to implement more complicated list commands, **extending the previous task**. Again, read a list and keep reading commands until you receive **`"end"`**:

- **`Contains {number}`** – check if the list contains the number and if so - print **`"Yes"`**, **otherwise** print **`"No such number"`.**
- **`PrintEven`** – print **all the even numbers, separated by a space**.
- **`PrintOdd`** – print **all the odd numbers, separated by a space**.
- **`GetSum`** – print the **sum of all the numbers**.
- **`Filter {condition} {number}`** – print all the numbers that **fulfill the given condition**. The condition will be either **`'<'`**, **`'>'`**, **`">="`**, **`"<="`**.

After the **end command,** print the list **only if** you have made some **changes** to the **original list**. **Changes** are made **only** from the commands from the **previous task**.

Example

Input	Output
5 34 678 67 5 563 98 Contains 23 PrintOdd GetSum Filter >= 21	No such number 5 67 5 563 1450 34 678 67 563 98

end	
2 13 43 876 342 23 543 Contains 100 Contains 543 PrintEven PrintOdd GetSum Filter >= 43 Filter < 100 end	No such number Yes 2 876 342 13 43 23 543 1842 43 876 342 543 2 13 43 23