# Lab: Sets and Dictionaries Advanced

Problems for the ["C# Advanced" course @ SoftUni](https://softuni.bg/trainings/4376/csharp-advanced-january-2024)  
You can check your solutions in [Judge](https://judge.softuni.org/Contests/1465/Sets-and-Dictionaries-Advanced-Lab)

## Dictionaries

### Count Same Values in Array

Create a program that counts in a given array of double values the number of occurrences of each value.

#### Examples

|  |  |
| --- | --- |
| **Input** | **Output** |
| -2.5 4 3 -2.5 -5.5 4 3 3 -2.5 3 | -2.5 - 3 times  4 - 2 times  3 - 4 times  -5.5 - 1 times |
| 2 4 4 5 5 2 3 3 4 4 3 3 4 3 5 3 2 5 4 3 | 2 - 3 times  4 - 6 times  5 - 4 times   1. - 7 times |

### Average Student Grades

Create a program, which reads a **name** of a student and his/her **grades** and **adds** them to the **student record**, then **prints** **the** students' **names** with their **grades** and their **average grade**.

#### Examples

|  |  |
| --- | --- |
| **Input** | **Output** |
| 7  John 5,20  Maria 5,50  John 3,20  Maria 2,50  Sam 2,00  Maria 3,46  Sam 3,00 | John -> 5.20 3.20 (avg: 4.20)  Maria -> 5.50 2.50 3.46 (avg: 3.82)  Sam -> 2.00 3.00 (avg: 2.50) |
| 4  Vlad 4.50  Peter 3.00  Vlad 5.00  Peter 3.66 | Vlad -> 4.50 5.00 (avg: 4.75)  Peter -> 3.00 3.66 (avg: 3.33) |
| 5  George 6.00  George 5.50  George 6.00  John 4.40  Peter 3.30 | George -> 6.00 5.50 6.00 (avg: 5.83)  John -> 4.40 (avg: 4.40)  Peter -> 3.30 (avg: 3.30) |

#### Hints

* Use a **dictionary** (string 🡪 List<decimal>)
* Check if the name **exists** before adding the grade. If it doesn't, add it to the dictionary.
* Pass through all **key-value pairs** in the dictionary and print the results. You can use the.Average() method to quickly calculate the average value from a list.

### Largest 3 Numbers

Read a **list of integers** and **print the largest 3 of them**. If there are less than 3, print all of them.

#### Examples

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Input** | **Output** |  | **Input** | **Output** |
| 10 30 15 20 50 5 | 50 30 20 | 20 30 | 30 20 |

#### Hints

* Read an array of integers.
* **Order the array using a LINQ query.**

**A picture containing text

Description automatically generated**

* **Print top 3 numbers with a for loop.**

### Product Shop

Create a program that prints information about **food shops** in Sofia and the **products** they **store**. Until the "Revision" command is received, you will be receiving input in the format: "{shop}, {product}, {price}". Keep in mind that if you receive a **shop** you already **have** **received**, you must **collect** its **product** **information**.

Your output must be **ordered** by shop **name** and must be in the format:

"{shop}->

Product: {product}, Price: {price}"

Note: The price should not be rounded or formatted.

#### Examples

|  |  |
| --- | --- |
| **Input** | **Output** |
| lidl, juice, 2.30  fantastico, apple, 1.20  kaufland, banana, 1.10  fantastico, grape, 2.20  Revision | fantastico->  Product: apple, Price: 1.2  Product: grape, Price: 2.2  kaufland->  Product: banana, Price: 1.1  lidl->  Product: juice, Price: 2.3 |
| tmarket, peanuts, 2.20  GoGrill, meatballs, 3.30  GoGrill, HotDog, 1.40  tmarket, sweets, 2.20  Revision | GoGrill->  Product: meatballs, Price: 3.3  Product: HotDog, Price: 1.4  tmarket->  Product: peanuts, Price: 2.2  Product: sweets, Price: 2.2 |

### Cities by Continent and Country

Create a program that reads **continents**, **countries** and their **cities** put them in a **nested dictionary** and **prints** them.

#### Examples

|  |  |
| --- | --- |
| **Input** | **Output** |
| 9  Europe Bulgaria Sofia  Asia China Beijing  Asia Japan Tokyo  Europe Poland Warsaw  Europe Germany Berlin  Europe Poland Poznan  Europe Bulgaria Plovdiv  Africa Nigeria Abuja  Asia China Shanghai | Europe:  Bulgaria -> Sofia, Plovdiv  Poland -> Warsaw, Poznan  Germany -> Berlin  Asia:  China -> Beijing, Shanghai  Japan -> Tokyo  Africa:  Nigeria -> Abuja |
| 3  Europe Germany Berlin  Europe Bulgaria Varna  Africa Egypt Cairo | Europe:  Germany -> Berlin  Bulgaria -> Varna  Africa:  Egypt -> Cairo |
| 8  Africa Somalia Mogadishu  Asia India Mumbai  Asia India Delhi  Europe France Paris  Asia India Nagpur  Europe Germany Hamburg  Europe Poland Gdansk  Europe Germany Danzig | Africa:  Somalia -> Mogadishu  Asia:  India -> Mumbai, Delhi, Nagpur  Europe:  France -> Paris  Germany -> Hamburg, Danzig  Poland -> Gdansk |

#### Hints

* Use a **nested** **dictionary** (string 🡪 (Dictionary 🡪 List<string>)) .
* Check if the continent exists before adding the country. If it doesn't, add it to the dictionary.
* Check if the country exists before adding the city. If it doesn't, add it to the dictionary.
* Pass through all **key-value pairs** in the dictionary and the values' key-value pairs and print the results.

## Sets

### Record Unique Names

Create a program, which will take a list of **names** and print **only** the **unique** names in the list.

#### Examples

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Input** | **Output** |  | **Input** | **Output** |  | **Input** | **Output** |
| 8  John  Alex  John  Sam  Alex  Alice  Peter  Alex | John  Alex  Sam  Alice  Peter |  | 7  Lyle  Bruce  Alice  Easton  Shawn  Alice  Shawn  Peter | Lyle  Bruce  Alice  Easton  Shawn |  | 6  Roki  Roki  Roki Roki  Roki  Roki | Roki |

#### Hints

You can store the names in a HashSet<string> to extract only the unique ones.

### Parking Lot

Create a program that:

* Records a **car number** for every car that enters the **parking lot.**
* Removes a **car number** when the car leaves the **parking lot.**

The input will be a string in the format: **"direction, carNumber"**. You will be receiving commands until the **"END"** commandisgiven.

Print the car numbers of the cars, which are still in the parking lot:

#### Examples

|  |  |
| --- | --- |
| **Input** | **Output** |
| IN, CA2844AA  IN, CA1234TA  OUT, CA2844AA  IN, CA9999TT  IN, CA2866HI  OUT, CA1234TA  IN, CA2844AA  OUT, CA2866HI  IN, CA9876HH  IN, CA2822UU  END | CA9999TT  CA2844AA  CA9876HH  CA2822UU |
| IN, CA2844AA  IN, CA1234TA  OUT, CA2844AA  OUT, CA1234TA  END | Parking Lot is Empty |

#### Hints

* Car numbers are **unique.**
* Before printing, **first** **check** if the set has any elements.

#### Solution

You can help yourself with the code below:



### SoftUni Party

#### There is a party in SoftUni. Many guests are invited and there are two types of them: VIP and Regular. When a guest comes, check if he/she exists in any of the two reservation lists.

All reservation numbers will be with the length of 8 chars.

All VIP numbers start with a digit.

First, you will be receiving the reservation numbers of the guests. You can also receive 2 possible commands:

* "PARTY" – After this command, you will begin receiving the reservation numbers of the people, who came to the party.
* "END" – The party is over and you have to stop the program and print the appropriate output.

In the end, print the count of the guests who didn't come to the party, and afterward, print their reservation numbers. the VIP guests must be first.

#### Examples

|  |  |  |  |
| --- | --- | --- | --- |
| **Input** | **Output** | **Input** | **Output** |
| 7IK9Yo0h  9NoBUajQ  Ce8vwPmE  SVQXQCbc  tSzE5t0p  PARTY  9NoBUajQ  Ce8vwPmE  SVQXQCbc  END | 2  7IK9Yo0h  tSzE5t0p | m8rfQBvl  fc1oZCE0  UgffRkOn  7ugX7bm0  9CQBGUeJ  2FQZT3uC  dziNz78I  mdSGyQCJ  LjcVpmDL  fPXNHpm1  HTTbwRmM  B5yTkMQi  8N0FThqG  xys2FYzn  MDzcM9ZK  PARTY  2FQZT3uC  dziNz78I  mdSGyQCJ  LjcVpmDL  fPXNHpm1  HTTbwRmM  B5yTkMQi  8N0FThqG  m8rfQBvl  fc1oZCE0  UgffRkOn  7ugX7bm0  9CQBGUeJ  END | 2  xys2FYzn  MDzcM9ZK |