Map and Set – Lab

This document defines the exercises for the ["C++ Advanced" course @ Software University](). Please submit your solutions (source code) to all below-described problems in [Judge]().

Write C++ code for solving the tasks on the following pages.

Code should compile under the C++03 or the C++11 standard.

1. Count Same Values in Array

Write 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 3 - 7 times

2. Average Student Grades

Write 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 Vlady 4.50 Peter 3.00 Vlady 5.00 Peter 3.66	Vlady -> 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)

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3. Cities by Continent and Country

Write a program that reads **continents**, **countries,** and their **cities** put them in a **nested Map** 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

I. Sets

4. Record Unique Names

Write 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 Ivan Pesho Ivan Stamat Pesho Alice Peter Pesho	Ivan Pesho Stamat Alice Peter	7 Lyle Bruce Alice Easton Shawn Alice Shawn Peter	Lyle Bruce Alice Easton Shawn	6 Roki Roki Roki Roki Roki Roki	Roki

5. Parking Lot

Write 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"** command is given.

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

6. Unique Usernames

Write a program that reads from the console a sequence of **N usernames** and keeps a collection only of the **unique** ones. On the **first** line, you will be given an integer **N**. On the next **N** lines, you will receive **one** username **per line**. Print the collection on the console in **order** of **insertion**:

Examples

Input	Output
6 Ivan Ivan Ivan Pesho Ivan NiceGuy1234	Ivan Pesho NiceGuy1234

7. Sets of Elements

Write a program that prints a **set of elements**. On the first line, you will receive two numbers - **n** and **m**, which represent the lengths of two separate sets. On the next **n + m** lines you will receive **n** numbers, which are the numbers in the **first** set, and **m** numbers, which are in the **second** set. Find all the **unique elements** that appear in **both of them** and **print** them in the order in which they appear in the **first** set - **n**.

For example:

Set with length n = 4: {1, **3**, **5**, 7}

Set with length m = 3: {**3**, 4, **5**}

Set that contains all the **elements** that repeat in **both sets** -> {**3**, **5**}

Examples

Input	Output
4 3 1 3 5 7 3 4 5	3 5
2 2 1 3 1 5	1

8. Periodic Table

Write a program that keeps all the **unique** chemical **elements**. On the first line, you will be given a number **n** - the **count** of input **lines** that you are going to receive. On the next **n** lines, you will be receiving **chemical compounds**, separated by a **single space**. Your task is to print all the **unique ones** in **ascending order**:

Examples

Input	Output
4 Ce O Mo O Ce Ee Mo	Ce Ee Mo O

3 Ge Ch O Ne Nb Mo Tc O Ne	Ch Ge Mo Nb Ne O Tc

9. Even Times

Write a program that **prints** a **number** from a collection, which appears an **even number** of **times** in it. On the first line, you will be given **n** – the **count** of **integers** you will receive. On the next n lines, you will be receiving **the numbers**. It is **guaranteed** that **only one** of them **appears** an **even number** of times. Your task is to **find** that **number** and **print** it in the end.

Examples

Input	Output
3 2 -1 2	2
5 1 2 3 1 5	1

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