# Exercises: Files, Directories and Exceptions

Problems for exercises and homework for the [“Programming Fundamentals” course @ SoftUni](https://softuni.bg/courses/programming-fundamentals).

This exercise does **NOT** have **Judge Contest**. That means that you will need to **create input and output files** from the examples and **test** the solutions on your own.

## Most Frequent Number

Write a program that finds the **most frequent number** in a given sequence of numbers.

* Numbers will be in the range **[0…65535]**.
* In case of multiple numbers with the same maximum frequency, print the **leftmost** one.

### Examples

|  |  |  |
| --- | --- | --- |
| **Input** | **Output** | **Output** |
| **4** 1 1 **4** 2 3 **4 4** 1 2 **4** 9 3 | 4 | The number **4** is the most frequent (occurs 5 times) |
| **2 2 2 2** 1 **2 2 2** | 2 | The number **2** is the most frequent (occurs 7 times) |
| **7 7 7** 0 2 2 2 0 10 10 10 | 7 | The numbers **2**, **7** and **10** have the same maximal frequence (each occurs 3 times). The leftmost of them is **7**. |

## Index of Letters

Write a program that creates an array containing all letters from the alphabet (**a**-**z**). Read a lowercase word from the console and print the **index of each of its letters in the letters array**.

### Examples

|  |  |
| --- | --- |
| **Input** | **Output** |
| abcz | a -> 0  b -> 1  c -> 2  z -> 25 |
| softuni | s -> 18  o -> 14  f -> 5  t -> 19  u -> 20  n -> 13  i -> 8 |

## Equal Sums

Write a program that determines if there **exists an element in the array** such that the **sum of the elements on its left** is **equal** to the **sum of the elements on its right**. If there are **no elements to the left / right**, their **sum is considered to be 0**. Print the **index** that satisfies the required condition or **“no”** if there is no such index.

### 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

Read a **list of integers** and find the **longest sequence of equal elements**. If several exist, print the **leftmost**.

### Examples

|  |  |
| --- | --- |
| **Input** | **Output** |
| 3 4 4 **5 5 5** 2 2 | 5 5 5 |
| **7 7** 4 4 5 5 3 3 | 7 7 |
| 1 2 **3 3** | 3 3 |

### Hints

* Scan positions **p** from left to right and keep the **start** and **length** of the current sequence of equal numbers ending at **p**.
* Keep also the currently best (longest) sequence (bestStart + bestLength) and update it after each step.

## A Miner Task

You are given a sequence of strings, each on a new line. Every odd line on the console is representing a resource (e.g. Gold, Silver, Copper, and so on), and every even – quantity. Your task is to **collect** the resources and **print** them each on a new line. **Print the resources and their quantities in format**:

**{resource} –> {quantity}**

The quantities inputs will be in the range **[1 … 2 000 000 000]**

### Examples

|  |  |
| --- | --- |
| **Input** | **Output** |
| Gold  155  Silver  10  Copper  17  stop | Gold -> 155  Silver -> 10  Copper -> 17 |

## Fix Emails

You are given a sequence of strings, each on a new line, **until you receive “stop” command**. First string is a name of a person. On the second line, you receive his email. Your task is to collect their names and emails, and remove emails whose domain ends with "us" or "uk" (case insensitive). Print:

**{name} – > {email}**

### Examples

|  |  |
| --- | --- |
| **Input** | **Output** |
| Ivan  ivanivan@abv.bg  Petar Ivanov  petartudjarov@abv.bg  Mike Tyson  myke@gmail.us  stop | Ivan -> ivanivan@abv.bg  Petar Ivanov -> petartudjarov@abv.bg |

## Advertisement Message

Write a program that **generate random fake advertisement message** to extol some product. The messages must consist of 4 parts: laudatory **phrase** + **event** + **author** + **city**. Use the following predefined parts:

* **Phrases** – {“Excellent product.”, “Such a great product.”, “I always use that product.”, “Best product of its category.”, “Exceptional product.”, “I can’t live without this product.”}
* **Events** – {“Now I feel good.”, “I have succeeded with this product.”, “Makes miracles. I am happy of the results!”, “I cannot believe but now I feel awesome.”, ”Try it yourself, I am very satisfied.”, “I feel great!”}
* **Author** – {“Diana”, “Petya”, “Stella”, “Elena”, “Katya”, “Iva”, “Annie”, “Eva”}
* **Cities** – {“Burgas”, “Sofia”, “Plovdiv”, “Varna”, “Ruse”}

The format of the output message is: **{phrase} {event} {author} – {city}**.

As an input, you take the **number of messages** to be generated. Print each random message at a separate line.

### Examples

|  |  |
| --- | --- |
| **Input** | **Output** |
| 3 | Such a great product. Now I feel good. Elena – Ruse  Excelent product. Makes miracles. I am happy of the results! Katya – Varna  Best product of its category. That makes miracles. Eva - Sofia |

### Hints

* Hold the phrases, events, authors and towns in 4 arrays of strings.
* Create Random object and generate 4 random numbers each in its range:
  + phraseIndex 🡪 ­[0, phrases.Length]
  + eventIndex 🡪 [0, events.Length]
  + authorIndex 🡪 [0, authors.Length]
  + townIndex 🡪 [0, towns.Length]
* Get one **random element** from each of the four arrays and **compose a message** in the required format.

## Average Grades

Define a class Student, which holds the following information about students: **name**, **list of grades** and **average grade** (calculated property, read-only). A single grade will be in range [2…6], e.g. 3.25 or 5.50.

Read a **list of students** and print the students that have **average grade ≥ 5.00** ordered **by name** (ascending), then by **average** **grade** (descending). Print the student name and the calculated average grade.

### Examples

|  |  |
| --- | --- |
| **Input** | **Output** |
| 3  Ivan 3  Todor 5 5 6  Diana 6 5.50 | Diana -> 5.75  Todor -> 5.33 |
| 6  Petar 3 5 4 3 2 5 6 2 6  Mitko 6 6 5 6 5 6  Gosho 6 6 6 6 6 6  Ani 6 5 6 5 6 5 6 5  Iva 4 5 4 3 4 5 2 2 4  Ani 5.50 5.25 6.00 | Ani -> 5.58  Ani -> 5.50  Gosho -> 6.00  Mitko -> 5.67 |

### Hints

* Create class Student with properties Name (string), Grades (double[]), and property AverageGrade (calculated by LINQ as Grades.Average(), read-only).
* Make a **list of students** and **filter with LINQ** all students that has average grade >= 5.00.
* Print the filtered students **ordered by name** in ascending order, then by **average grade** in descending order.

## Book Library

To model a **book library**, define classes to hold a **book** and a **library**. The library must have a **name** and a **list of books**. The books must contain the **title**, **author**, **publisher**, **release date**, **ISBN-number** and **price.**

Read a **list of books**, add them to the library and print the **total sum of prices by author**,ordered **descending by price** and **then by author’s name lexicographically**.

Books in the input will be in format {title} {author} {publisher} {release date} {ISBN} {price}.

### Examples

|  |  |
| --- | --- |
| **Input** | **Output** |
| 5  LOTR Tolkien GeorgeAllen 29.07.1954 0395082999 30.00  Hobbit Tolkien GeorgeAll 21.09.1937 0395082888 10.25  HP1 JKRowling Bloomsbury 26.06.1997 0395082777 15.50  HP7 JKRowling Bloomsbury 21.07.2007 0395082666 20.00  AC OBowden PenguinBooks 20.11.2009 0395082555 14.00 | Tolkien -> 40.25  JKRowling -> 35.50  OBowden -> 14.00 |

### Hints

* Create classes Book and Library with all the mentioned above properties:****
* **Create** an object of type Library.
* **Read the input** and create a Bookobject for each book in the input.
* Create a **LINQ** query that will **sum the prices by author**, **order the results** as requested.
* **Print** the results.

## Book Library Modification

Use the classes from the previous problem and make a program that **read a list of books** and **print all titles** **released after given date** ordered **by date** and then **by** **title lexicographically**. The date is given if format “**day-month-year**” at the last line in the input.

### Examples

|  |  |
| --- | --- |
| **Input** | **Output** |
| 5  LOTR Tolkien GeorgeAllen 29.07.1954 0395082999 30.00  Hobbit Tolkien GeorgeAll 21.09.1937 0395082888 10.25  HP1 JKRowling Bloomsbury 26.06.1997 0395082777 15.50  HP7 JKRowling Bloomsbury 21.07.2007 0395082666 20.00  AC OBowden PenguinBooks 20.11.2009 0395082555 14.00  30.07.1954 | HP1 -> 26.06.1997  HP7 -> 21.07.2007  AC -> 20.11.2009 |