# Exercises: Functional Programming

This document defines the exercises for the ["Java Advanced" course @ Software University.](https://softuni.bg/trainings/4374/java-advanced-january-2024) Please submit your solutions (source code) to all below-described problems in [Judge](https://judge.softuni.org/Contests/1514/Functional-Programming-Exercises).

## Consumer Print

Write a program that **reads** a collection of **strings**, separated by one or **more** whitespaces, from the console and then prints them onto the console. Each string should be printed on a new line. Use a **Consumer<T>**.

### Examples

|  |  |
| --- | --- |
| **Input** | **Output** |
| Peter George Alex | Peter  George  Alex |
| John Sam Sara | John  Sam  Sara |

## Knights of Honor

Write a program that **reads a collection of names** as strings from the console and then **appends** "**Sir**" in front of every name and prints it back onto the console. Use a **Consumer<T>**.

### Examples

|  |  |
| --- | --- |
| **Input** | **Output** |
| Peter George Alex Stan | Sir Peter  Sir George  Sir Alex  Sir Stan |
| Alex George Peter | Sir Alex  Sir George  Sir Peter |

## Custom Min Function

Write a simple program that **reads** a **set of numbers** from the console and finds the **smallest** of the **numbers** using a simple **Function<Integer[], Integer>**.

### Examples

|  |  |
| --- | --- |
| **Input** | **Output** |
| 1 4 3 2 1 7 13 | 1 |
| 4 5 -2 3 -5 8 | -5 |

## Applied Arithmetic

On the first line, you are given a **list of numbers**. On the next lines you are passed different **commands** that you need to apply to all numbers in the list: "**add**" -> adds 1; "**multiply**" -> multiplies by 2; "**subtract**" -> subtracts 1; "**print**" -> prints all numbers on **a new line**. The input will end with an "**end**" command, after which the result must be printed.

**Examples**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Input** | **Output** |  | **Input** | **Output** |
| 1 2 3 4 5  add  add  print  end | 3 4 5 6 7 | 5 10  multiply  subtract  print  end | 9 19 |

## Reverse and Exclude

Write a program that **reverses** a collection and **removes** elements that are **divisible** by a given integer **n**.

### Examples

|  |  |
| --- | --- |
| **Input** | **Output** |
| 1 2 3 4 5 6  2 | 5 3 1 |
| 20 10 40 30 60 50  3 | 50 40 10 20 |

## Predicate for Names

Write a **predicate**. Its goal is to **check** a name for its length and to return **true** if the length of the name is **less or equal** to the passed **integer**. You will be given an **integer** that represents the length you have to use. On the second line, you will be given a **string** array with some names. Print the names, passing the **condition** in the predicate.

### Examples

|  |  |  |  |
| --- | --- | --- | --- |
| **Input** | **Output** | **Input** | **Output** |
| 4  Sara Sam George Mark John | Sara  Sam  Mark  John | 4  George Peter Zara Sara | Zara Sara |

## Find the Smallest Element

Write a program that is using a custom **function** (written by you) to find the **smallest** integer in a **sequence** of **integers**. The input could have more than one space. Your task is to **collect** the integers from the console, find the **smallest** **one** and print its **index** (if **more** than one such elements exist, print the index of the **rightmost** one).

### Hints

* Use a **Function<List<Integer>, Integer>** or something similar.

### Examples

|  |  |
| --- | --- |
| **Input** | **Output** |
| 1 2 3 0 4 5 6 | 3 |
| 123 10 11 3 | 3 |

## Custom Comparator

Write a custom **comparator** that **sorts** all even numbers before all **odd** ones in **ascending order**. Pass it to an **Arrays.sort()** function and print the result.

### Examples

|  |  |
| --- | --- |
| **Input** | **Output** |
| 1 2 3 4 5 6 | 2 4 6 1 3 5 |
| -3 2 | 2 -3 |

## List of Predicates

Find all **numbers** in the range **1..N** that is **divisible** by the numbers of a given sequence. Use **predicates**.

### Examples

|  |  |
| --- | --- |
| **Input** | **Output** |
| 10  1 1 1 2 | 2 4 6 8 10 |
| 100  2 5 10 20 | 20 40 60 80 100 |

## Predicate Party!

The Wire's parents are on vacation for the holidays, and he is planning an epic party at home. Unfortunately, his organizational skills are next to non-existent, so you are given the task of helping him with the reservations.

On the first line, you get a **list** of all the **people** that are coming. On the next lines, until you get the "**Party**!" command, you may be asked to **double** or **remove** all the people that apply to the **given** **criteria**. There are three different options:

* Everyone that has a name **starts** with a given string.
* Everyone that has a name **ending** with a given string.
* Everyone has a name with a given **length**.

When you print the guests that are coming to the party, you have to print them in **ascending** order. If nobody is going, print "**Nobody is going to the party!**"**.** See the examples below:

### Examples

|  |  |
| --- | --- |
| **Input** | **Output** |
| Peter Misha Stephan  Remove StartsWith P  Double Length 5  Party! | Misha, Misha, Stephan are going to the party! |
| Peter  Double StartsWith Pete  Double EndsWith eter  Party! | Peter, Peter, Peter, Peter are going to the party! |
| Peter  Remove StartsWith P  Party! | Nobody is going to the party! |

## \* The Party Reservation Filter Module

You are a young and talented **developer**. The first task you need to do is to implement a **filtering module** to a party reservation software. First, The Party Reservation Filter Module (**TPRF** Module for short) is passed a **list** with invitations. Next, the **TPRF** receives a sequence of **commands** that specify if you need to add or remove a given filter.

**TPRF** Commands are in the given format "**{command;filter type;filter parameter}**".

You can receive the following **TPRF** commands: "**Add filter**", "**Remove filter**" or "**Print**". The possible **TPRF** filter types are: "**Starts with**"**,** "**Ends with**"**,** "**Length**",and"**Contains**"**.** All **TPRF** filter parameters will be a string (or an integer for the length filter).

The input will end with a "**Print**" command. See the examples below:

### Examples

|  |  |  |  |
| --- | --- | --- | --- |
| **Input** | **Output** | **Input** | **Output** |
| Peter Misha Slav  Add filter;Starts with;P  Add filter;Starts with;M  Print | Slav | Peter Misha John  Add filter;Starts with;P  Add filter;Starts with;M  Remove filter;Starts with;M  Print | Misha John |