

Lab: Stream API

Problems for exercises and homework for the ["Java Advanced" course @ SoftUni](#).

You can check your solutions here: <https://judge.softuni.bg/Contests/Practice/Index/465#0>.

Part I: Stream<T> and Types of Streams

1. Take Two

Read a **sequence of integers**, given on a single line separated by a space.

Finds all **unique** elements, such that $10 \leq n \leq 20$ and print only **the first 2 elements**.

If there are **fewer than 2 elements**, print as much as there are. If there are **no elements**, print nothing.

Examples

Input	Output
15 2 15 14 12	15 14
17 -2 3	17
-2 3	(no output)

Hints

- Read the input using a **Scanner** or a **BufferedReader** and parse the strings to a list of numbers:

```
Scanner scanner = new Scanner(System.in);
List<String> tokens =
    Arrays.asList(scanner.nextLine().split("\\s+"));

List<Integer> numbers = new ArrayList<>();
for (String token : tokens) {
    numbers.add(Integer.valueOf(token));
}
```

- Filter the numbers with **filter()**, take the unique ones with **distinct()**, take only two from the stream with **limit()** and iterate over them while printing with **forEach()**:

```
numbers.stream()
    .filter(n -> 10 <= n && n <= 20)
    .distinct()
    .limit(2)
    .forEach(n -> System.out.print(n + " "));
```

2. Upper Strings

Read a sequence of strings, given on a single line separated with a space.

Map each to upper case and print them, using the Stream API.

Examples

Input	Output
Pesho Gosho Stefan	PESHO GOSHO STEFAN
Soft Uni Rocks	SOFT UNI ROCKS
(empty line)	(no output)

Hints

- Read the input using a **Scanner** or a **BufferedReader** into a list of strings **List<String>**:

```
BufferedReader reader = new BufferedReader(new InputStreamReader(System.in));  
List<String> strings = Arrays.asList(reader.readLine().split("\\s+"));
```

- Call a stream over the list and map every element to upper case. Iterate over the stream and print the result:

```
strings.stream()  
    .map(s -> s.toUpperCase())  
    .forEach(s -> System.out.print(s + " "));
```

3. First Name

Read a **sequence of names**, given on a single line, separated by a space.

Read a **sequence of letters**, given on the next line, separated by a space.

Find the **names that start with one of the given letters** and print the first of them (**ordered lexicographically**).

If there is **no name** that conforms to the requirement, **print "No match"**.

Examples

Input	Output
Rado Plamen Gosho p r	Plamen
Plamen Gosho Rado s c	No match

Hints

- You can use a hash set to store letter, for efficient searching
- Make sure you are comparing letter with the same casing (lower or upper)
- Use **filter()**, **sorted()** and **findFirst()**
- Use **Optional<T>**

4. Average of Doubles

Read a **sequence of double numbers**, given on a single line, separated by a space.

Find the **average of all elements**, using the Stream API.

Round the output to the second digit after the decimal separator.

If there are **no numbers** in the sequence, **print "No match"**.

Examples

Input	Output
3 4 5 6	4.50
3.14 5.2 6.18	4.84
(empty List)	No match

Hints

- Use a primitive stream **DoubleStream**
- Use **OptionalDouble**
- Make sure to filter empty strings before transforming the stream

Part II: Types of Operations

5. Min Even Number

Read a sequence of numbers, given on a single line, separated by a space.

Find the smallest number of all even numbers, using the Stream API.

If there are **no numbers** in the sequence, **print "No match"**.

Examples

Input	Output
1 2 3 4 5 6	2.00
3.14 -2.00 1.33	-2.00
(empty List)	No match

Hints

- Use map function to map the objects to **Double**
- Make sure to filter empty strings
- Filter the even numbers
- Get the smallest number using **Double.compare(x1, x2)**

6. Find and Sum Integers

Read a sequence of elements, given on a single line, separated by a space.

Filter all elements that are integers and calculate their sum, using the Stream API.

If there are **no numbers** in the sequence, **print "No match"**.

Examples

Input	Output
Sum 3 and 4	7
Sum -3 and -4	-7
Sum three and four	No match

Hints

- Use **filter** → **map** → **reduce** pattern
- Check if element's char at index 0 is a sign (+ or -)
- Check if all else element's chars are digits

7. *Map Districts

On the first line, you are given the population count of districts in different cities, separated by a single space in the format **"city:district population"**.

On the second line, you are given the minimum population for filtering of the towns. The **population of a town** is the **sum of populations of all of its districts**.

Print all **cities** with population greater than a given. **Sort cities and districts** by descending population and **print top 5 districts for a given city**.

For a better understanding, see the examples below.

Examples

Input	Output
Pld:9 Pld:13 Has:7 Sof:20 Sof:10 Sof:15 10	Sof: 20 15 10 Pld: 13 9
Sof:10 Sof:12 Sof:15 10	Sof: 15 12 10
Sof:5 15	(no output)

Hints

- Read the input into a **proper collection**:

```
HashMap<String, List<Integer>> cities = new HashMap<>();
List<String> tokens = Arrays.asList(scanner.nextLine().split("\\s+"));

for (String token : tokens) {
    String[] tokenArgs = token.split(":");
    String city = tokenArgs[0];
    int districtPopulation = Integer.valueOf(tokenArgs[1]);

    cities.putIfAbsent(city, new ArrayList<>());
    cities.get(city).add(districtPopulation);
}
```

- Read the population bound

```
int bound = Integer.valueOf(scanner.nextLine());
```

- **Filter, sort and print** the cities:

```
cities.entrySet().stream()
    .filter(getFilterByPopulationPredicate(bound))
    .sorted(getSortByDescendingPopulationComparator())
    .forEach(getPrintMapEntryConsumer());
```

- Create methods for generating **lambda expressions**, stored in **functional interfaces**
- Create a method that returns a **predicate for filtering**:

```
private static Predicate<Map.Entry<String, List<Integer>>> getFilterByPopulationPredicate(int bound) {
    return kv -> kv.getValue().stream()
        .mapToInt(Integer::valueOf)
        .sum() >= bound;
}
```

- Create a method that returns a **comparator for sorting**:

```
private static Comparator<Map.Entry<String, List<Integer>>> getSortByDescendingPopulationComparator() {
    return (kv1, kv2) ->
        Integer.compare(
            kv2.getValue().stream().mapToInt(Integer::valueOf).sum(),
            kv1.getValue().stream().mapToInt(Integer::valueOf).sum());
}
```

- Create a method that returns a **consumer for printing a map entry**:

```
private static Consumer<Map.Entry<String, List<Integer>>> getPrintMapEntryConsumer() {
    return kv -> {
        System.out.print(kv.getKey() + ": ");
        kv.getValue().stream()
            .sorted((s1, s2) -> s2.compareTo(s1))
            .limit(5)
            .forEach(dp -> System.out.print(dp + " "));
        System.out.println();
    };
}
```

8. Bounded Numbers

On the first line, read two numbers, a **lower** and an **upper bound**, separated by a space.

On the second line, read a sequence of numbers, separated by a space.

Print all numbers, such that $[\text{lower bound}] \leq n \leq [\text{upper bound}]$.

Examples

Input	Output
5 7 1 2 3 4 5 6 7 8 9	5 6 7
7 5 9 5 7 2 6 8	5 7 6
3 4 5 6 7 8	(no output)

Hints

- Use `collect(Collectors.toList())`