# More Exercises: Objects, Classes, Files and Exceptions

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

Check your solutions [here](https://judge.softuni.bg/Contests/Compete/Index/584).

# Objects and Classes

## Order by Age

You will receive an **unknown** number of lines. On each line, you will receive array with **3** elements. **The first** element will be string and represents the name of the person. **The second** element will be a **string** and will represent the **ID** of the person. **The last** element will be an **integer** and represents the **age** of the person.

When you receive the command “**End**”, stop taking input and print **all the** **people**, **ordered** by **age**.

### Examples

|  |  |
| --- | --- |
| **Input** | **Output** |
| Georgi 123456 20  Pesho 78911 15  Stefan 524244 10  End | Stefan with ID: 524244 is 10 years old.  Pesho with ID: 78911 is 15 years old.  Georgi with ID: 123456 is 20 years old. |

|  |  |
| --- | --- |
| **Input** | **Output** |
| Maria 123456 120  Georgi 31241 50  Denis 41231 23  End | Denis with ID: 41231 is 23 years old.  Georgi with ID: 31241 is 50 years old.  Maria with ID: 123456 is 120 years old. |

### Hints

* For C#, you can use .OrderBy(…) from System.Linq to specify according to which parameter to order the people.
* For Java, you can do the same with .sorted(…)from **Stream API**.

## Vehicle Catalogue

You have to make a catalogue for vehicles. You will receive two types of vehicle – **car** or **truck**.

Until you receive the command “**End**” you will receive **lines** of **input** in the format:

|  |
| --- |
| {typeOfVehicle} {model} {color} {horsepower} |

After the “**End**” command, you will start receiving **models** of **vehicles**. Print for every received vehicle its **data** in the format:

|  |
| --- |
| Type: {typeOfVehicle}  Model: {modelOfVehicle}  Color: {colorOfVehicle}  Horsepower: {horsepowerOfVehicle} |

When you receive the command “**Close the Catalogue**”, stop receiving input and print the **average** **horsepower** for the **cars** and for the **trucks** in the format:

{typeOfVehicles} have average horsepower of {averageHorsepower}.

The **average** **horsepower** is calculated by **dividing** the **sum** of **horsepower** for **all** vehicles of the type by the **total** **count** of **vehicles** from the **same** **type**.

Format the answer to the **2nd decimal point**.

### Constraints

* The type of vehicle will always be **car** or **truck**.
* You will not receive the **same** **model** **twice**.
* The received horsepower will be integer in the interval **[1…1000]**
* You will receive at most **50** vehicles.
* **Single** whitespace will be used for **separator**.

### Examples

|  |  |
| --- | --- |
| **Input** | **Output** |
| truck Man red 200  truck Mercedes blue 300  car Ford green 120  car Ferrari red 550  car Lamborghini orange 570  End  Ferrari  Ford  Man  Close the Catalogue | Type: Car  Model: Ferrari  Color: red  Horsepower: 550  Type: Car  Model: Ford  Color: green  Horsepower: 120  Type: Truck  Model: Man  Color: red  Horsepower: 200  Cars have average horsepower of: 413.33.  Trucks have average horsepower of: 250.00. |

|  |  |
| --- | --- |
| **Input** | **Output** |
| Car Skoda grey 90  car Nissan black 90  car Bugatti blue 1000  End  Skoda  Close the Catalogue | Type: Car  Model: Skoda  Color: grey  Horsepower: 90  Cars have average horsepower of: 393.33.  Trucks have average horsepower of: 0.00. |

## \* Jarvis

Every kid’s dream is to have its own personal robot to be their butler and/or slave. Until now, we could not build a fully functional robot, but we can write a program, which simulates what it would be like to build. Let’s call him a code name – **Jarvis**.

Our robot will consist of **6** components – **2** arms, **2** legs, **torso** and a **head**. Make **classes** for these components and your robot should have **fields** for **each** of the **components**.

**Each** component has **different** properties:

* Arms have:
  + Energy consumption **(integer)**
  + Arm reach distance **(integer)**
  + Count of fingers **(integer)**
* Legs have:
  + Energy consumption **(integer)**
  + Strength **(integer)**
  + Speed **(integer)**
* Torso has:
  + Energy consumption **(integer)**
  + Processor size in centimeters **(double)**
  + Housing material **(string)**
* Head has:
  + Energy consumption **(integer)**
  + IQ **(integer)**
  + Skin material **(string)**

On the first line, you will receive the **maximum** **energy capacity** of the **robot**. **Until** you receive the command “**Assemble!**”, you will continuously receive lines with data for **different** components in format:

{typeOfComponent} {energyConsumption} {property1} {property2}

The properties will **always** be given in the **same** **order** as they are described above. If you receive a **component** which is more **energy** **efficient** than **previous** one – you should **delete** the old component and **replace** it with the **new** one.

### Input

* On the **first** line, you will receive the **maximum** **energy** **capacity** of the robot.
* Until you receive the command “**Assemble!**” you will receive components in the format:  
  {typeOfComponent} {energyConsumption} {property1} {property2}

### Output

* If you do **not** have enough **energy** **efficient** components to **assemble** the robot print:  
  “We need more power!”
* If you do not have enough parts print:  
  “We need more parts!”
* If you **can** build a **robot** with the given **components** print:

|  |
| --- |
| Jarvis:  #Head:  ###Energy consumption: {head’s energy consumption}  ###IQ: {head’s IQ}  ###Skin material: {head’s skin material}  #Torso:  ###Energy consumption: {torso’s energy consumption}  ###Processor size: {size of the processor}  ###Corpus material: {torso’s corpus material}  #Arm:  ###Energy consumption: {arm’s energy consumption}  ###Reach: {arm’s reach}  ###Fingers: {count of fingers}  #Arm:  ###Energy consumption: {arm’s energy consumption}  ###Reach: {arm’s reach}  ###Fingers: {count of fingers}  #Leg:  ###Energy consumption: {head’s energy consumption}  ###Strength: {leg’s strength}  ###Speed: {leg’s speed}  #Leg:  ###Energy consumption: {head’s energy consumption}  ###Strength: {leg’s strength}  ###Speed: {leg’s speed} |

Print the **arms** and the **legs** ordered by **energy** consumption in **ascending order**.

### Constraints

* Jarvis’ energy will be in the interval **[0…9223372036854775807]**
* Components’ energy will be in the interval **[-2147483648…2147483647]**

### Examples

|  |  |
| --- | --- |
| **Input** | **Output** |
| 1000  Head 500 20 Leather  Torso 300 3 Aluminum  Leg 150 20 20  Leg 100 30 30  Arm 500 20 30  Leg 80 30 30  Arm 120 20 5  Arm 100 30 4  Head 200 20 Leather  Assemble! | Jarvis:  #Head:  ###Energy consumption: 200  ###IQ: 20  ###Skin material: Leather  #Torso:  ###Energy consumption: 300  ###Processor size: 3.0  ###Corpus material: Aluminum  #Arm:  ###Energy consumption: 100  ###Reach: 30  ###Fingers: 4  #Arm:  ###Energy consumption: 120  ###Reach: 20  ###Fingers: 5  #Leg:  ###Energy consumption: 80  ###Strength: 30  ###Speed: 30  #Leg:  ###Energy consumption: 100  ###Strength: 30  ###Speed: 30 |

|  |  |
| --- | --- |
| **Input** | **Output** |
| 5000  Leg 1000 20 30  Arm 500 30 50  Arm 500 30 20  Arm 500 30 50  Arm 300 60 80  Torso 700 30 40  Leg 200 100 100  Assemble! | We need more parts! |

|  |  |
| --- | --- |
| **Input** | **Output** |
| 500  Head 500 20 Leather  Torso 300 3 Aluminum  Leg 150 20 20  Leg 100 30 30  Arm 500 20 30  Leg 80 30 30  Arm 120 20 5  Arm 100 30 4  Head 200 20 Leather  Assemble! | We need more power! |

### Hints

* You might want to override the ToString(…) method in some of your classes.

# Files

For these tasks, you will receive **sample\_text.txt file**, which you have to use to make your **exercises**. Just **submit** the **result** of the tasks as plain **text** in the **Judge**.

## Punctuation Finder

Read the file, which is in the resource section of the exercise and print all the **punctuation** marks, which you **find** and **separate** them with **comma**. For punctuation marks you can consider only: “**.**”, “**,**”, “**!**”, “**?**” and “**:**”.

Submit the **output** in **judge**.

### Examples

|  |  |
| --- | --- |
| **File Content** | **Output** |
| Lorem ipsum dolor sit amet, consectetur adipiscing elit, sed do eiusmod tempor incididunt ut labore et dolore magna aliqua.  *More text will be given…* | ,, ,, .,  *Continues…* |

## Write to File

Read the **same** file, as in the **previous** task, but this time write everything, **except** the **punctuation** marks to a **new** file. Again, consider as punctuations only: “**.**”, “**,**”, “**!**”, “**?**” and “**:**”.

Submit the content of the file in **judge.**

### Examples

|  |  |
| --- | --- |
| **File Content** | **Output** |
| Lorem ipsum dolor sit amet, consectetur adipiscing elit, sed do eiusmod tempor incididunt ut labore et dolore magna aliqua.  ***More text will be given…*** | Lorem ipsum dolor sit amet consectetur adipiscing elit sed do eiusmod tempor incididunt ut labore et dolore magna aliqua  ***Continues…*** |

## \*\* EXCELlent Knowledge

You received excel table named **sample\_table.xlsx**. Write a program, which **reads** the table and **prints** all the columns **separated** with single **pile** (‘**|**’).

### Examples

The **first** line of your table should look like this:

|  |
| --- |
| **Output** |
| ZIP|Sales|Name|Year|Value|  ***Continues…*** |

### Hints

* For C#:
  + Add reference to [Microsoft Excel Object Library](https://docs.microsoft.com/en-us/dotnet/csharp/programming-guide/interop/how-to-access-office-onterop-objects).
  + You can follow [this](https://coderwall.com/p/app3ya/read-excel-file-in-c) guide for writing the code.
* For Java:
  + You should create Maven project in IntelliJ. You can make it [this way](https://www.jetbrains.com/help/idea/getting-started-with-maven.html).
  + You can find more information about Apache Maven [here](https://maven.apache.org/).
  + After that follow, this [guide](http://www.codejava.net/coding/how-to-read-excel-files-in-java-using-apache-poi) to read the Excel file.

# Exceptions

## Play Catch

You will receive on the **first** line an **array** of **integers**. After that you will receive **commands**, which should **manipulate** the array:

* “**Replace {index} {element}**” – **Replace** the element at the given **index** with the given **element**.
* “**Print {startIndex} {endIndex}**” – **Print** the elements from the **start** index to the **end** index **inclusive**.
* “**Show {index}**” – **Print** the element at the **index**.

You have the task to **rewrite** the **messages** from the **exceptions** which can be **produced** from your **program**:

* If you receive an **index**, which does **not** **exist** in the **array** print:  
  “The index does not exist!”
* If you receive a **variable**, which is of **invalid** **type**:  
  “The variable is not in the correct format!”

When you catch **3** exceptions – **stop** the **input** and **print** the **elements** of the array separated with “, ”.

### Examples

|  |  |
| --- | --- |
| **Input** | **Output** |
| **1 2 3 4 5**  Replace 1 9  Replace 6 3  Show 3  Show pesho  Show 6 | The index does not exist!  4  The variable is not in the correct format!  The index does not exist!  1, 9, 3, 4, 5 |

|  |  |
| --- | --- |
| **Input** | **Output** |
| 1 2 3 4 5  Replace 3 9  Print 1 4  Print -3 12  Print 1 5  Show 3  Show 12.3  1, 2, 3, 4, 5 | 2, 3, 9, 5  The index does not exist!  The index does not exist!  9  The variable is not in the correct format!  1, 2, 3, 9, 5 |

### Constraints

* The **elements** of the array will be in **integers** in the interval **[-2147483648…2147483647]**
* You will always receive **valid** string for the **first** part of the **command**, but the **parameters** might be **invalid**
* In the “**Print**”command always be true **startIndex <= endIndex**
* You will always **receive** at least **3** exceptions

## \* Personal Exception

Write your own exception, which is thrown every time a **negative** **number** is received from the **console**. The **message** of the **exception** should be “**My first exception is awesome!!!**”

Your task is to print every number **greater or equal** to **0.**

If **negative** number is given as input – **catch** the exception and **print** **exception’s** message. **Stop** the program when your Exception is **thrown**.

### Examples

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Input** | **Output** |  | **Input** | **Output** |
| 1  2  3  -5 | 1  2  3  My first exception is awesome!!! | 1  2  3  -4  5 | 1  2  3  My first exception is awesome!!! |

### Hints

* For C#:
  + Make **new** class for the **exception** and choose appropriate name
  + Inherit the class System.Exception
  + Make one **constructor**, which **inherits** the **base**
  + Pass the **message** to the **base** constructor
  + In the Main() make while loop and **throw** **exception**, if the input number is less than 0
  + Catch the exception and print the message. You can access the message with Exception.Message
* For Java:
  + Make **new** class for the **exception** and choose appropriate name
  + Inherit the class java.lang.Exception
  + Make one **constructor**, which **inherits** the **super**
  + Pass the **message** to the **super** constructor
  + In the main() make while loop and **throw** **exception**, if the input number is **less** **than** **0**
  + Catch the exception and print the message. You can access the message with Exception.getMessage()

Submit a **.zip** archive with the **main** method and the **exception’s class**.