# More Exercises: Dictionaries and Lists

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/582>.

## Sort Times

Write a program, which receives a **list of times** (space-separated, 24-hour format) and **sorts** them in **ascending order**. Print the sorted times **comma-separated**.

Example: **06:55, 02:30, 23:11** 🡺 **02:30, 06:55, 21:11**

### Examples

|  |  |
| --- | --- |
| **Input** | **Output** |
| 00:00 06:04 02:59 10:33 11:22 06:01 | 00:00, 02:59, 06:01, 06:04, 10:33, 11:22 |
| 04:25 04:21 04:19 | 04:19, 04:21, 04:25 |
| 00:00 23:59 12:00 16:00 | 00:00, 12:00, 16:00, 23:59 |

## Odd Filter

Write a program, which receives an array of **integers** (space-separated), **removes** all the odd numbers, then **converts** the remaining numbers to **odd numbers**, based on these conditions:

* If the number is **larger than** the **average** of the collection of remaining numbers, **add** **1** to it.
* If the number is **smaller than** the **average** of the collection of remaining numbers, **subtract** **1** from it.

After you convert all of the elements to odd numbers, **print** them on the console **(space-separated)**.

### Examples

|  |  |
| --- | --- |
| **Input** | **Output** |
| 1 2 3 4 5 6 7 8 9 10 | 1 3 5 9 11 |
| 99 88 77 66 55 4 33 22 11 | 89 67 3 21 |
| 23 32 199 723 8127 95 | 31 |

## Immune System

An **organism** can encounter different types of **viruses**. It stores them in its **immune system**. If it has already encountered the virus, it fights it **faster** than if it hasn’t encountered it yet.

The immune system can calculate the **virus’ strength** before it fights it. It is the **sum** of **all the virus name’s letters’ ASCII codes, divided by 3**.

The immune system can also **calculate** the time it takes to **defeat** a **virus** in **seconds**. It is equal to the **virus strength, multiplied** by the **length** of the virus’ **name**.

When you calculate the **time to defeat** the virus, **convert** it to **minutes** and **seconds** (500 🡺 8m 20s). **Do not** use any leading zeroes for the minutes and seconds.

The virus is **fought** according to **these conditions**:

* If the immune system **defeats** the virus, print:  
  “{virusName} defeated in {virusDefeatMinutes}m {virusDefeatSeconds}s.”
* If the virus’ strength is **more than** the **immune system’s strength**, print “Immune System Defeated.” and exit the program.

After a virus is **defeated**, the **immune system** regains **20%** of its **strength**. If the 20 percent **exceeds** the **initial health** of the immune system, set it to the **initial health** instead.

Example: The virus “flu1”:

* Virus Strength: **102 (f) + 108 (l) + 117 (u) + 49 (1)** = **376 / 3** = **125.33 = 125**.
* Time to defeat: 125 \* 4 (virus name **length**) = 500 seconds 🡺 8m 20s.

Example 2: Encountering “flu1” a **second time**:

* Time to defeat: **(125 \* 4) / 3** = **166.66 🡺 166 seconds**

If you encounter a virus any subsequent times, **do not** decrease its **time to defeat** further. When you receive the line “end”, print the status of the immune system in the format “Final Health: {finalHealth}”.

### Input

* First line: the **initial health** of the immune system
* On new lines, until you receive “end”: **virus names**

### Output

A **defeated** virus’ output looks like this:

* First line: “Virus {virusName}: {virusStrength} => {virusDefeatSeconds}”
* Second line: “{virusName} defeated in {defeatMins}m {defeatSecs}s.”
* Third line: “Remaining health: {remainingHealth}”. The remaining health is printed **before** its regeneration.

### Examples

|  |  |
| --- | --- |
| **Input** | **Output** |
| 5000  flu1  test  flu1  virusssssss  end | Virus flu1: 125 => 500 seconds  flu1 defeated in 8m 20s.  Remaining health: 4500  Virus test: 149 => 596 seconds  test defeated in 9m 56s.  Remaining health: 4404  Virus flu1: 125 => 166 seconds  flu1 defeated in 2m 46s.  Remaining health: 4834  Virus virusssssss: 419 => 4609 seconds  virusssssss defeated in 76m 49s.  Remaining health: 391  Final Health: 469 |
| 1750  Ebola  ebola  Ebola  end | Virus Ebola: 161 => 805 seconds  Ebola defeated in 13m 25s.  Remaining health: 945  Virus ebola: 171 => 855 seconds  ebola defeated in 14m 15s.  Remaining health: 279  Virus Ebola: 161 => 268 seconds  Ebola defeated in 4m 28s.  Remaining health: 66  Final Health: 79 |
| 5700  wannacry  iskaplache  wannacry | Virus wannacry: 289 => 2312 seconds  wannacry defeated in 38m 32s.  Remaining health: 3388  Virus iskaplache: 348 => 3480 seconds  iskaplache defeated in 58m 0s.  Remaining health: 585  Virus wannacry: 289 => 770 seconds  Immune System Defeated. |

## Supermarket Database

Write a program, which keeps information about **products** and their **prices**. Each product has a **name**, a **price** and its **quantity**. If the product **doesn’t exist** in the database yet, **add** it with its **starting quantity**.

If you receive a product, which **already exists** in the database, **increase** its quantity by the input quantity and if its **price** is different, **replace** the price as well.

You will receive products’ **names**, **prices** and **quantities** on **new lines**.Until you receive the command “stocked”, keep adding items to the database. When you do receive the command “stocked”, print the items with their **names**, **prices**, **quantities** and **total price** of all the products with that name. When you’re done printing the items, print the **grand total price** of all the items.

*Note: The* ***grand total*** *is calculated, based on the* ***latest price*** *of the products.*

### Input

* Until you receive “stocked”, the products come in the format: “{name} {price} {quantity}”.
* The product data is **always** delimited by a **single space**.

### Output

* Print information about **each** **product**, following the format:   
  “{name}: ${price:F2} \* {quantity} = ${total:F2}”
* On the next line, print **30 dashes**.
* On the final line, print the **grand total** in the following format:  
  “Grand Total: ${grandTotal:F2}”

### Examples

|  |  |
| --- | --- |
| **Input** | **Output** |
| Beer 2.20 100  IceTea 1.50 50  NukaCola 3.30 80  Water 1.00 500  stocked | Beer: $2.20 \* 200 = $440.00  IceTea: $1.50 \* 100 = $150.00  NukaCola: $3.30 \* 160 = $528.00  Water: $1.00 \* 1000 = $1000.00  ------------------------------  Grand Total: $2118.00 |
| Beer 2.40 350  Water 1.25 200  IceTea 5.20 100  Beer 1.20 200  IceTea 0.50 120  stocked | Beer: $1.20 \* 900 = $1080.00  Water: $1.25 \* 400 = $500.00  IceTea: $0.50 \* 320 = $160.00  ------------------------------  Grand Total: $1740.00 |
| CesarSalad 10.20 25  SuperEnergy 0.80 400  EvenSupererEnergy 1.00 400  Beer 1.35 350  beer 0.50 450  IceCream 1.50 25  stocked | CesarSalad: $10.20 \* 50 = $510.00  SuperEnergy: $0.80 \* 800 = $640.00  EvenSupererEnergy: $1.00 \* 800 = $800.00  Beer: $1.35 \* 700 = $945.00  beer: $0.50 \* 900 = $450.00  IceCream: $1.50 \* 50 = $75.00  ------------------------------  Grand Total: $3420.00 |

## Parking Validation

SoftUni just got a huge, shiny new **parking lot** in a super-secret location (under the Code Ground hall). It’s so fancy, it even has online **parking validation**. Except, the online service doesn’t work. It can only receive users’ data, but doesn’t know what to do with it. Good thing you’re on the dev team and know how to fix it, right?

Write a program, which validates parking for an online service. Users can **register** to park and **unregister** to leave.

The system supports **license plate validation**. A valid license plate has the following **3** distinct characteristics:

* It is **always** **exactly 8 characters long**.
* Its **first 2** and **last 2 characters** are always **uppercase Latin letters**
* The **4 characters in the middle** are always **digits**

If any of the aforementioned conditions fails, the **license plate** is **invalid**.

The program **receives 2 commands**:

* “register {username} {licensePlateNumber}”:
  + The system only supports **one car per user** at the moment, so if a user tries to register **another license plate**, using the **same username**, the system should print:  
    “ERROR: already registered with plate number {licensePlateNumber}”
  + If the **license plate** is **invalid**, the system should print:  
    “ERROR: invalid license plate {licensePlateNumber}“
  + If the user tries to register **someone else’s license plate**, the system should print:  
    “ERROR: license plate {licensePlateNumber} is busy”
  + If the aforementioned checks **pass** **successfully**, the plate **can be registered**, so the system should print:  
    “{username} registered {licensePlateNumber} successfully”
* “unregister {username}”:
  + If the user is **not present** in the database, the system should print:  
    “ERROR: user {username} not found”
  + If the aforementioned check passes successfully, the system should print:  
    “user {username} unregistered successfully”

After you execute all of the commands, **print** all the currently **registered users** and their **license plates** in the format:

* “{username} => {licensePlateNumber}”

### Input

* First line: **n** – **number of commands** – **integer**
* Next **n** lines: **commands** in one of **two** possible formats:
  + Register: “register {username} {licensePlateNumber}”
  + Unregister: “unregister {username}”

The input will **always** be **valid** and you **do not need** to check it explicitly.

### Examples

|  |  |
| --- | --- |
| **Input** | **Output** |
| 5  register some0ne CS1234JS  register vankata JAVA123S  register vankata AB4142CD  register housey VR1223EE  unregister housey | some0ne registered CS1234JS successfully  ERROR: invalid license plate JAVA123S  vankata registered AB4142CD successfully  housey registered VR1223EE successfully  user housey unregistered successfully  some0ne => CS1234JS  vankata => AB4142CD |
| 4  register testUser AA4132BB  register testuser AA4132BB  register testuser AA9999BB  unregister testUser | testUser registered AA4132BB successfully  ERROR: license plate AA4132BB is busy  testuser registered AA9999BB successfully  user testUser unregistered successfully  testuser => AA9999BB |
| 7  register gosho mm1111XX  register gosho MM1111xx  register gosho MMaaaaXX  unregister gosho  register gosho MM1111XX  unregister gosho  unregister pesho | ERROR: invalid license plate mm1111XX  ERROR: invalid license plate MM1111xx  ERROR: invalid license plate MMaaaaXX  ERROR: user gosho not found  gosho registered MM1111XX successfully  user gosho unregistered successfully  ERROR: user pesho not found |

## Byte Flip

Write a program, which receives a **string array** (space-separated), containing **bytes** in **hexadecimal** **format** with the **digits reversed**.

Yourtask is to **remove** any elements whose length is **different than 2**, then **reverse** the digits in **every number**, and finally **reverse** the whole collection and **convert every element** from **hexadecimal** **numbers** to **characters** from the **ASCII table**.

**Print** the resulting string of **ASCII characters** on the console.

### Input

* First line: the **array** of **strings**, representing a **byte array**.

### Output

* First line: The **resulting string** from the input.

### Examples

|  |  |
| --- | --- |
| **Input** | **Output** |
| A 12 B 46 C 56 DDD 46 EEE F6 FFF 36 56 46 | decoded! |
| 37 56 47 97 26 02 D6 56 86 47 02 07 96 C6 66 | flip them bytes |
| E7 E7 E7 155 33 F5 C 23 12 13 | 1!2\_3~~~ |

## \* Take/Skip Rope

Write a program, which reads a **string** and **skips** through it, extracting a **hidden message**. The algorithm you have to implement is as follows:

Let’s take the string “skipTest\_String044170” as an example.

Take every **digit** from the string and **store it** somewhere. After that, **remove** all the digits from the string. After this operation, you should have **two lists of items**: the **numbers list** and the **non-numbers list**:

* Numbers list: [0, 4, 4, 1, 7, 0]
* Non-numbers: [s, k, i, p, T, e, s, t, \_, S, t, r, i, n, g]

After that, take every digit in the **numbers list** and split it up into a **take list** and a **skip list**, depending on whether the digit is in an **even** or an **odd** index:

* Numbers list: [0, 4, 4, 1, 7, 0]
* Take list: [0, 4, 7]
* Skip list: [4, 1, 0]

Afterwards, **iterate** over both of the lists and **skip** {skipCount} characters from the **non-numbers list**, then **take** {takeCount} characters and store it in a **result string**. Note that the skipped characters are **summed up** as they go. The process would look like this on the aforementioned **non-numbers list**:

1. Skip **4** characters (total **0**), take **0** characters 🡺 “**skipTest\_String**” 🡺 Taken: “” 🡺 Result: “”
2. Skip **1** characters (total **4**), take **4** characters 🡺 “**skipTest\_String**” 🡺 Taken: “**Test**” 🡺 Result: “**Test**”
3. Skip **0** characters (total **9**), take **7** characters 🡺 “**skipTest\_String**” 🡺 Taken: “**String**” 🡺 Result: “**TestString**”

After that, just print the **result string** on the console.

### Input

* First line: The **encrypted** message as a **string**

### Output

* First line: The **decrypted** message as a **string**

### Constraints

* The count of digits in the input string will **always be even**.
* The encrypted message will contain any printable ASCII character.

### Examples

|  |  |
| --- | --- |
| **Input** | **Output** |
| T2exs15ti23ng1\_3cT1h3e0\_Roppe | TestingTheRope |
| O{1ne1T2021wf312o13Th111xreve!!@! | OneTwoThree!!! |
| this forbidden mess of an age rating 0127504740 | hidden message |