# Exercise: Regular Expressions

Problems for exercises and homework for the ["Programming Fundamentals" course @ SoftUni](https://softuni.bg/trainings/4220/programming-fundamentals-with-java-september-2023).

You can check your solutions in [Judge.](https://judge.softuni.org/Contests/1673/Regular-Expressions-Exercises)

## Furniture

Write a program to calculate the total cost of different types of furniture. You will be given some lines of input until you receive the line "**Purchase**". For the line to be valid, it should be in the following format:

"**>>{furniture name}<<{price}!{quantity}**"

The price can be a floating-point number or a whole number. Store the names of the furniture and the total price. In the end, print each bought furniture on a separate line in the format:

"**Bought furniture:**

**{1st name}**

**{2nd name}**

**…**"

And on the last line, print the following: "**Total money spend: {spend money}**", formatted to the second decimal point.

### Examples

|  |  |  |
| --- | --- | --- |
| **Input** | **Output** | **Comment** |
| >>Sofa<<312.23!3  >>TV<<300!5  >Invalid<<!5  Purchase | Bought furniture:  Sofa  TV  Total money spend: 2436.69 | Only the Sofa and the TV are valid, for each of them we multiply the price by the quantity and print the result. |
| >>TV<<312.23!3  >>Monitor<<300!5  >>Invalid<<<<!5  >>Sink<<220!10  >>>>>>Invalid<<!5  Purchase | Bought furniture:  TV  Monitor  Sink  Total money spend: 4636.69 |  |

## \*SoftUni Bar Income

Let's take a break and visit the game bar at SoftUni. It is about time for the people behind the bar to go home, and you are the person who has to draw the line and calculate the money from the products that were sold throughout the day. Until you receive a line with the text **"**end of shift**",** you will be given lines of input. But before processing that line, you have to do some validations first.

**Each valid order** should have a **customer, product, count, and price:**

* Valid customer's name should be **surrounded by** '**%**'and must **start with a capital letter**, followed by **lower-case letters.**
* Valid product **contains any word character** and must be **surrounded by** '**<**' **and** '**>**'.
* The valid count is an **integer** **surrounded by** '**|**'.
* The valid price is any **real number followed by** '**$**'.

The parts of a valid order should appear in the order given: **customer, product, count, and price**.

Between each part there can be other symbols, except ('**|**'**,** '**$**'**,** '**%**' **and** '**.** ')

For each valid line print on the console: **"**{customerName}: {product} - {totalPrice}**"**

When you receive **"**end of shift**",** print the total amount of money for the day **rounded to 2 decimal places** in the following format: **"**Total income: {income}**".**

### Input / Constraints

* Strings must be processed until you receive the text **"**end of shift**".**

### Output

* Print all the valid lines in the format **"**{customerName}: {product} - {totalPrice}**".**
* After receiving **"**end of shift**"** print the total amount of money for the day rounded to 2 decimal places in the following format: **"**Total income: {income}**".**
* Allowed working **time** / **memory**: **100ms** / **16MB**.

### Examples

|  |  |  |
| --- | --- | --- |
| **Input** | **Output** | **Comment** |
| %George%<Croissant>|2|10.3$  %Peter%<Gum>|1|1.3$  %Maria%<Cola>|1|2.4$  end of shift | George: Croissant - 20.60  Peter: Gum - 1.30  Maria: Cola - 2.40  Total income: 24.30 | Each line is valid, so we print each order, calculating the total price of the product bought.  In the end, we print the total income for the day |
| %InvalidName%<Croissant>|2|10.3$  %Peter%<Gum>1.3$  %Maria%<Cola>|1|2.4  %Valid%<Valid>valid|10|valid20$  end of shift | Valid: Valid - 200.00  Total income: 200.00 | On the first line, the customer name isn't valid, so we skip that line. The second line is missing product count.  The third line doesn't have a valid price.  And only the fourth line is valid |

## \*Star Enigma

The war is at its peak, but you, young Padawan, can turn the tides with your programming skills. You are tasked to create a program to **decrypt** the messages of The Order and prevent the death of hundreds of lives.

You will receive several messages, which are **encrypted** using the legendary star enigma. You should **decrypt the messages** following these rules:

To properly decrypt a message, you should **count all the letters** **[s, t, a, r]** – **case insensitive** and **remove** the count from the **current ASCII value of each symbol** of the encrypted message.

After decryption:

Each message should have a **planet name, population, attack type ('A', as an attack or 'D', as destruction), and soldier count.**

The planet's name **starts after** **'@'** and contains **only letters from the Latin alphabet**.

The planet population **starts after ':'** and is an **Integer**;

The attack type may be **"A"(attack) or "D"(destruction)** and must be **surrounded by "!"** (Exclamation mark).

The **soldier count** starts after **"->"** and should be an Integer.

The order in the message should be: **planet name -> planet population -> attack type -> soldier count.** Each part can be separated from the others by **any character except: '@', '-', '!', ':' and '>'.**

### Input / Constraints

* The **first line** **holds n** – the number of **messages** – **integer in the range [1…100].**
* On the next **n** lines, you will be receiving encrypted messages.

### Output

After decrypting all messages, you should print the decrypted information in the following format:

First print the attacked planets, then the destroyed planets.  
**"**Attacked planets: {attackedPlanetsCount}**"**  
**"**-> {planetName}**"**  
**"**Destroyed planets: {destroyedPlanetsCount}**"**  
**"**-> {planetName}**"**

The planets should be **ordered by name** **alphabetically.**

### Examples

|  |  |  |
| --- | --- | --- |
| **Input** | **Output** | **Comments** |
| 2  **ST**CDoghudd4=63333$D$0**A**53333  EHf**s**y**ts**nhf?8555&I&2C9555**SR** | Attacked planets: 1  -> Alderaa  Destroyed planets: 1  -> Cantonica | We receive two messages, and to decrypt them, we calculate the key:  The first message has decryption key 3. So we subtract from each character's code 3.  **PQ@Alderaa1:30000!A!->20000**  The second message has key 5.  **@Cantonica:3000!D!->4000NM**  **Both messages are valid and** contain planet, population, attack type, and soldier count.  After decrypting all messages, we print each planet according to the format given. |
| 3  **tt**(''DG**s**vywge**r**x>6444444444%H%1B9444  GQh**rr**|**A**977777(H(**TTTT**  EHf**s**y**ts**nhf?8555&I&2C9555**SR** | Attacked planets: 0  Destroyed planets: 2  -> Cantonica  -> Coruscant | We receive three messages.  Message one is decrypted with key 4:  **pp$##@Coruscant:2000000000!D!->5000**  Message two is decrypted with key 7:  **@Jakku:200000!A!MMMM**  This is the **invalid message**, missing soldier count, so we continue.  The third message has key 5.  **@Cantonica:3000!D!->4000NM** |

## \*Nether Realms

A mighty battle is coming. In the stormy nether realms, demons fight against each other for supremacy in a duel from which only one will survive.

Your job, however, is not so exciting. You must **sign in all the participants** in the nether realm's mighty battle's demon book.

A demon's **name contains his health and his damage**.

The **sum of the asci codes** of **all characters** (excluding numbers (0-9), arithmetic symbols (**'+', '-', '\*', '/'**) and delimiter dot (**'.'**)) gives a **demon's total health**.

**The sum of all numbers** in his name forms his base damage. Note that you should consider the plus **'+'** and minus **'-'** signs (e.g., **+10 is 10** and **-10 is -10**). However, there are some symbols (**'\*'** and **'/'**) that can further **alter the base damage by multiplying or dividing it by 2** (e.g. in the name "m**15**\*/c**-5.0**", the base damage is **15 + (-5.0) = 10** and then you need to multiply it by 2 (e.g. 10 \* 2 = 20) and then divide it by 2 (e.g. 20 / 2 = 10)).

So, **multiplication and division** are applied **only after all numbers are included** in the calculation and **the order they appear in the name**.

### Input

The input will be read from the console. The input consists of a **single line** containing all demon names **separated by commas and zero or more spaces** in the format: **"{demon name}, {demon name}, … , {demon name}"**

### Output

Print all demons, each on a separate line in the format:

* **"{demon name} - {health points} health, {damage points} damage"**

### Constraints

* A demon's name will contain **at least one character.**
* A demon's name **cannot contain** blank spaces ' ' or commas ','.
* A **floating-point number will always have digits before and after its decimal separator.**
* **The number** in a demon's name **is considere**d everything that is a valid integer or floating point number (with a dot '.' used as separator). For example, all these are valid numbers: '4', '+4', '-4', '3.5', '+3.5', '-3.5'.

### Examples

|  |  |  |
| --- | --- | --- |
| **Input** | **Output** | **Comments** |
| M3ph-0.5s-0.5t0.0\*\* | M3ph-0.5s-0.5t0.0\*\* - 524 health, 8.00 damage | M3ph-0.5s-0.5t0.0\*\*:  Health = 'M' + 'p' + 'h' + 's' + 't' = 524 health.  Damage = (3 + (-0.5) + (-0.5) + 0.0) \* 2 \* 2 = 8 damage. |
| M3ph1st0\*\*, Azazel | M3ph1st0\*\* - 524 health, 16.00 damage  Azazel - 615 health, 0.00 damage | M3ph1st0\*\*:  Health - 'M' + 'p' + 'h' + 's' + 't' = 524 health.  Damage - (3 + 1 + 0) \* 2 \* 2 = 16 damage.  Azazel:  Health - 'A' + 'z' + 'a' + 'z' + 'e' + 'l' = 615 health. Damage - no digits = 0 damage. |
| Gos/ho | Gos/ho - 512 health, 0.00 damage |  |

## \*Extract Emails

Write a program to **extract all email addresses from a given text**. The text comes at the only input line. Print the emails on the console, each at a separate line. Emails are considered to be in format <user>@<host>, where:

* **<user>** is a sequence of **letters** and **digits**, where '.', '-' and '\_' can appear between them.
  + Examples of valid users: "**stephan**", "**mike03**", "**s.johnson**", "**st\_steward**", "**softuni-bulgaria**", "**12345**".
  + Examples of invalid users: ''**--123**", "**.....**", "**nakov\_-**", "**\_steve**", "**.info**".
* **<host>** is a sequence of at least two words, separated by dots '**.**'. Each word is a sequence of letters and can have hyphens '**-**' between the letters.
  + Examples of hosts: "**softuni.bg**", "**software-university.com**", "**intoprogramming.info**", "**mail.softuni.org**".
  + Examples of invalid hosts: "**helloworld**", "**.unknown.soft.**", "**invalid-host-**", "**invalid-**".
* Examples of **valid emails**: "**info@softuni-bulgaria.org**", "**kiki@hotmail.co.uk**", "**no-reply@github.com**", "**s.peterson@mail.uu.net**", "**info-bg@software-university.software.academy**".
* Examples of **invalid emails**: "**--123@gmail.com**", "**…@mail.bg**", "**.info@info.info**", "**\_steve@yahoo.cn**", "**mike@helloworld**", "**mike@.unknown.soft.** ", "**s.johnson@invalid-**".

### Examples

|  |  |
| --- | --- |
| **Input** | **Output** |
| Please contact us at: support@github.com. | support@github.com |
| Just send email to s.miller@mit.edu and j.hopking@york.ac.uk for more information. | s.miller@mit.edu  j.hopking@york.ac.uk |

## \*Valid Password

Your first task is to determine if the given sequence of characters is a **valid** online banking password.

**Each line must not contain anything else but a valid password**. A password is **valid** when:

* It is surrounded by a "\_" followed by one or more "."
* It is **at least 6 characters long** (without the surrounding "\_" or ".")
* **It starts** with a **capital letter**
* It contains **only letters** (lower and upper case) **and digits**
* **It ends** with a **capital letter**

Examples of valid passwords: \_...ChelseA\_., \_..Online1BankinG\_., \_.Valid1PasS\_., \_.A123f23A\_.

Examples of invalid passwords: **\_\_InvalidPass..**, **\_Invalid\_**, **\_.Invalid.IteM\_., \_.pass1InvaliD\_.**

Next, you have to determine which **group** the **password** is from. The group is obtained by **concatenating** **all the digits** found in the password, if any. If there are **no digits** present in the password, the **default** group is "default".

Examples:

\_...ChelseA\_. -> group: default

\_..Online1BankinG\_. -> group: 1

\_.A123f23A\_.-> group: 12323

### Input

On the **first line**, you will be given an integer **n** – the count of passwords that you will be receiving next.

On the following **n** lines, you will receive different strings.

### Output

For each password that you process, you need to print a message.

If the password is invalid:

* "Invalid pass!"

If the password is valid:

* "Group: {group}"

### Examples

|  |  |
| --- | --- |
| **Input** | **Output** |
| 3  **\_...ChelseA\_.**  **\_..Online1BankinG\_.**  \_.A1f23A\_. | Group: default  Group: 1  Group: 123 |
| 5  \_.Online2BanK\_.  \_\_.Pass2Da\_.  \_.InvaliDitem\_.  \_.My2Pass47S\_...  \_...QAPassV\_.. | Group: 2  Invalid pass!  Invalid pass!  Group: 247  Group: default |