# Exercises: Regular Expressions (RegEx)

This document defines the **exercise assignments** for the ["Programming Fundamentals Extended" course @ Software University](https://softuni.bg/courses/programming-fundamentals). Please submit your solutions (source code) of all below described problems in [Judge](https://judge.softuni.bg/Contests/444).

## Cards

You will be given sequences of playing cards. Your task is to print the valid ones of them, separated by a **comma** and a **space**.

The **VALID playing cards** have:

* **power** – **2**, **3**, **4**… **10**, **J**, **Q**, **K**, **A**.
* **suit** – **S**, **H**, **D**, **C**

A card is formed by its power and its suit in the following format: {power}{suit}. . ., but **ONLY** those with **valid** **power** and **valid suit**, should be **considered** **VALID**.

So a valid car would look like this: **KS**, **10S**, **2D**, **3D**.

### Input

The input will consist of a **single line**, containing a sequence of cards.

### Output

The output should be a single line, containing the valid cards, separated by a **comma** and a **space**.

### Examples

|  |  |
| --- | --- |
| **Input** | **Output** |
| 2S3S4S5S6S | 2S, 3S, 4S, 5S, 6S |
| 2SASKS6SJSQSOS | 2S, AS, KS, 6S, JS, QS |

## Fish Statistics

You are a marine biologist tasked with researching various types of fish. You will receive a **single line** on the console as input. From this line, you must extract **all the fish** you find and **print statistics** about **each** **one**.  
Fish are categorized by three criteria: **tail length**, **body length** and **status**. A standard fish looks like this:

|  |
| --- |
| ><(((('> |

This fish has a **tail length** of **1**, a **body length** of **4** and has the **status** “**Awake**”, since its **eye is open**. **One ASCII character** represents 2 **centimeters** in real life. By those standards, this fish has a **tail length** of **2 cm** and a **body length** of **8 cm**. There are various **types** of **tails**, **bodies** and **statuses**, which are described below:

* Tail types:
  + Tail **longer** than **5** “<” characters 🡪 Long
  + Tail **longer** than **1** “<” characters 🡪 Medium
  + Tail, which is **1** “<” character long 🡪 **Short**
  + Nonexistent tail 🡪 **None**
* Body types:
  + Body **longer** than **10** “(” characters 🡪 Long
  + Body **longer** than **5** “(” characters 🡪 Medium
  + Any other length 🡪 **Short**
* Statuses:
  + **'** 🡪 Awake
  + **-** 🡪 Asleep
  + **x** 🡪 Dead

The input will contain a **variable amount of fish**, separated by any sequence of **ASCII characters**. There’s a **possibility** you might receive input, which has **no fish** – in this case, just print “No fish found.”, and end the program.

### Examples

|  |  |
| --- | --- |
| **Input** | **Output** |
| ><(((('> >>>><((((((((('>~~~~~<((->~~~ o o >>>><((x> | Fish 1: ><(((('>  Tail type: Short (2 cm)  Body type: Short (8 cm)  Status: Awake  Fish 2: >>>><((((((((('>  Tail type: Medium (8 cm)  Body type: Medium (18 cm)  Status: Awake  Fish 3: <((->  Tail type: None  Body type: Short (4 cm)  Status: Asleep  Fish 4: >>>><((x>  Tail type: Medium (8 cm)  Body type: Short (4 cm)  Status: Dead |
| o oo >>>><((-> \* ()()()(): | Fish 1: >>>><((->  Tail type: Medium (8 cm)  Body type: Short (4 cm)  Status: Asleep |
| o o ><(-> >><(('> <(((((((((x> \* #%#$@ \* | Fish 1: ><(->  Tail type: Short (2 cm)  Body type: Short (2 cm)  Status: Asleep  Fish 2: >><(('>  Tail type: Medium (4 cm)  Body type: Short (4 cm)  Status: Awake  Fish 3: <(((((((((x>  Tail type: None  Body type: Medium (18 cm)  Status: Dead |
| o xx xxxx ~ ~ ~ xxxx | No fish found. |

## Word encounter

You will be given a **filter**, in the form of a **string** of **two characters** – the **first** being an **ASCII character**, and the **second** – a **digit**.

You will then receive a **sequence of sentences**. You must extract **all words** from those sentences, and print **only** the **words** that **contain** the **given filter character**, **at least** **N times** – **N** being the **filter digit**.

There are **2 types** of sentences – **Valid** and **Invalid**. The **valid ones**, always **start** with a **capital** **letter**, and **always** **end** with one of the following characters: “**.**”, “**!**”, “**?**”. Invalid sentences, should be ignored.

**Note**: You **WILL NOT** be given more than **1 sentence** on a **single input line**.

The input sequence ends, when you receive the command “**end**”. After that you must print all the filtered words, you’ve gathered.

The **valid words** must be printed, on a **single line**, **separated** by a **comma** and a **space**.

### Examples

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| --- | --- |
| **Input** | **Output** |
| l2  This will, likely be a funny feeling, Laslo.  Will you come to my playlife ;)?  end | will, likely, Will, playlife |
| o1  How about... No...  Maaan, this is amazing! Yeah; I know bro!  end | How, about, No, know, bro |

### Hint

Check if there is a way to find where a word, in a sentence, starts, and ends. There surely must be a way to do that with Regular Expressions.

## Happiness Index

You will be given a **string**, consisting of one or several **emoticons** and random **garbage characters** in-between them. Your task is to count the **happy** and **sad** emoticons and calculate the **happiness index** of the string. The index is calculated by this formula: {happyEmoticonsCount} / {sadEmoticonsCount}. The happiness index is then **rounded** to the **second** decimal place. **Two** emoticons will **never touch**.

The emoticons of all the emotion types are as follows:

* Happy: :), :D, ;), :\*, :], ;], :}, ;}, (:, \*:, c:, [:, [;
* Sad: :(, D:, ;(, :[, ;[, :{, ;{, ):, :c, ]:, ];

After you calculate the happiness index, **print** the final emoticon score, following this format:

* Happiness index **greater than or equal** to **2** 🡪 :D
* Happiness index **greater than 1** 🡪 :)
* Happiness index **equal** to **1** 🡪 :|
* Happiness index **smaller than 1** 🡪 :(

### Examples

|  |  |
| --- | --- |
| **Input** | **Output** |
| :)^%&:)\*\*&:]v;)ff:( | Happiness index: 4.00 :D [Happy count: 4, Sad count: 1] |
| &&:(&:)z:)zz%%!%%!%%!%:( | Happiness index: 1.00 :|  [Happy count: 2, Sad count: 2] |
| <<<<<<<<<<<]:bb:[<<<<<<<<<:}<<<<<<:(<<<<<<:)z:)z:)&@^@%@ | Happiness index: 1.33 :) [Happy count: 4, Sad count: 3] |
| ;(&m%td[:^i+@#:{eqk#n | Happiness index: 0.50 :(  [Happy count: 1, Sad count: 2] |

### Hints

* Regex [named capturing groups](http://www.regular-expressions.info/named.html) might come in handy for this problem.

## \* Commits

Believe it or not, GitHub doesn’t process its commits using software. They achieve their versatile version control by employing the services of a small man, named Master Branch. Mr. Branch is sick of parsing the huge amounts of data every single day and needs your help.

Write a program, which receives **lines** of **URLs**. Until you receive the command “git push”, your task is to **parse** the URLs, which come in the following format:

**https://github.com/{user}/{repo}/commit/{hash},{message},{additions},{deletions}**

Valid input will follow this format. If any input doesn’t follow this format, **ignore it**. The validation rules are as follows:

* The **username** may contain **alphanumeric characters** (Latin letters and digits) and **hyphens** (-).
* The **repository name** may contain **alphanumeric characters**, **hyphens** and **underscores**.
* The **commit hash** will be a **SHA-1** hash, and as such, it may contain **only** **hexadecimal** **characters** (digits and letters A through F). Since SHA-1 hashes are always 20 bytes long, the commit hash will also **always** be **40 characters** long.
* The message may contain **any** character, **except** the **new** **line** character.
* The **additions** and **deletions** are numbers and may **only** contain **digits**.

While parsing the input, you also need to **categorize** it for Mr. Branch. Every **user** has his own **repos** (a user cannot have two repos with the **same name**) and every **repo** has a list of **commits**. The users are **sorted alphabetically by name**. The repos are also **sorted alphabetically by name**. The **commits** are sorted by **order of insertion**.

After you receive the command “git push”, your task is to print information about the commits in the following format:

|  |
| --- |
| {user}:  {repo}:  commit {hash}: {message} ({additionsCount} additions, {deletionsCount} deletions)  commit {hash}: {message} ({additionsCount} additions, {deletionsCount} deletions)  …  Total: {totalAdditionsCount} additions, {totalDeletionsCount} deletions |

### Examples

|  |
| --- |
| **Input** |
| https://github.com/gosho/http-parser/commit/f17c563aed112dabbdbe977fcdb88772be7d85eb,general fixes,14,3 https://github.com/pesho-1232/db-checker/commit/5ca49ccc157c98af2c71391223e4b254ee327134,fix SELECT statement,9,19 https://github.com/gosho/http-parser/commit/1f0abbdf5006b4a88aed1b72f9a937b35a5126dc,One does not simply merge into master,1,15 https://github.com/stamat4o/hackertools/commit/ddb473ab0304e5e843983da8b26925dbb3495afa,another big bag of changes,8,18 **git push** |

|  |
| --- |
| **Output** |
| gosho:  http-parser:  commit f17c563aed112dabbdbe977fcdb88772be7d85eb: general fixes (14 additions, 3 deletions)  commit 1f0abbdf5006b4a88aed1b72f9a937b35a5126dc: One does not simply merge into master (1 additions, 15 deletions)  Total: 15 additions, 18 deletions  pesho-1232:  db-checker:  commit 5ca49ccc157c98af2c71391223e4b254ee327134: fix SELECT statement (9 additions, 19 deletions)  Total: 9 additions, 19 deletions  stamat4o:  hackertools:  commit ddb473ab0304e5e843983da8b26925dbb3495afa: another big bag of changes (8 additions, 18 deletions)  Total: 8 additions, 18 deletions |

|  |
| --- |
| **Input** |
| https://github.com/A4B5TR/ceca-music-player/commit/5ca49ccc157c98af2c71391223e4b254ee327134,implement mile kitic,16,16  https://github.com/Huosey/3ds-hax/commit/c4994a26e7370d9e482e9317c9a0489648c83fc6,for free,8,20  https://github.com/A4B5TR/ceca-music-player/commit/136aa8bd1ac90d58230767027db5d2d0f3a6b9a5,lots and lots of changes,12,3  https://github.com/A4B5TR/ceca-music-player/commit/d5cdb78e9a10af7f929dfa070577ef548bdadbb9,stuff,17,3  https://github.com/dirtyhaxxor/csbotrepo/commit/8d99397247811cdc0210a92c9beb21bb20689dbc,add rush b functionality,1,6  **git push** |

|  |
| --- |
| **Output** |
| A4B5TR:  ceca-music-player:  commit 5ca49ccc157c98af2c71391223e4b254ee327134: implement mile kitic (16 additions, 16 deletions)  commit 136aa8bd1ac90d58230767027db5d2d0f3a6b9a5: lots and lots of changes (12 additions, 3 deletions)  commit d5cdb78e9a10af7f929dfa070577ef548bdadbb9: stuff (17 additions, 3 deletions)  Total: 45 additions, 22 deletions  dirtyhaxxor:  csbotrepo:  commit 8d99397247811cdc0210a92c9beb21bb20689dbc: add rush b functionality (1 additions, 6 deletions)  Total: 1 additions, 6 deletions |

|  |
| --- |
| **Input** |
| https://github.com/prakash/thymeleef/commit/e97c8637a13bf911e55030681884c8301a67e1dd,[MAJOR FEAT] minor fix,8,7  https://github.com/ivanov33/superstartup/commit/56e566a92b48e430b4a81fd05fe777fbd612e085,it's 5am. It works. I quit.,9,2  https://github.com/ivanov34/superstartup/commit/460afc15d7f7ab14be7966bc13019c17de96b3b2,sorry I'm new. merged every branch to master,1990048,2913460  https://github.com/prakash/thymeleef/commit/f17c563aed112dabbdbe977fcdb88772be7d85eb,[MINOR FEAT] fixed spelling error,19,14  https://github.com/ivanov35/superstartup/commit/ecd3e802dec29c41e7f4d653e1019749f4ca6eec,ivanov34 got fired.. rebased to 3rd commit..,6,20  https://github.com/ivanov34/superstartup/commit/71c2c02ccf8da0765d21a79bf9bcfe1dd87f1544,im back,18,2  https://github.com/adamash/thyme$leef/commit/58033134ca5bfb1c2cd606513f02b854ba7529c9,hehe,1,2  https://github.com/prakash/thymeleef/commit/44b801d6aa6e37d5960d14734d10e87cfc6ec0a8,I'm done,16,0  git push |

|  |
| --- |
| **Output** |
| ivanov33:  superstartup:  commit 56e566a92b48e430b4a81fd05fe777fbd612e085: it's 5am. It works. I quit. (9 additions, 2 deletions)  Total: 9 additions, 2 deletions  ivanov34:  superstartup:  commit 460afc15d7f7ab14be7966bc13019c17de96b3b2: sorry I'm new. merged every branch to master (1990048 additions, 2913460 deletions)  commit 71c2c02ccf8da0765d21a79bf9bcfe1dd87f1544: im back (18 additions, 2 deletions)  Total: 1990066 additions, 2913462 deletions  ivanov35:  superstartup:  commit ecd3e802dec29c41e7f4d653e1019749f4ca6eec: ivanov34 got fired.. rebased to 3rd commit.. (6 additions, 20 deletions)  Total: 6 additions, 20 deletions  prakash:  thymeleef:  commit e97c8637a13bf911e55030681884c8301a67e1dd: [MAJOR FEAT] minor fix (8 additions, 7 deletions)  commit f17c563aed112dabbdbe977fcdb88772be7d85eb: [MINOR FEAT] fixed spelling error (19 additions, 14 deletions)  commit 44b801d6aa6e37d5960d14734d10e87cfc6ec0a8: I'm done (16 additions, 0 deletions)  Total: 43 additions, 21 deletions |

### Hints

* You can store information about the commits in a custom **Commit** class, which contains the **commit hash**, **message**, **additions** and **deletions**. After that, calculating the total additions and deletions per repo is only a **LINQ** query away.