Exercises: Strings and Regular Expressions

Problems for exercises and homework for the "JavaScript Fundamentals" course @ SoftUni. Submit your solutions in the SoftUni judge system at https://judge.softuni.bg/Contests/314/.

In this exercise you are supposed to **write program logic** using the basic operations between Strings and the built-in String functions, as well as regular expressions, in JavaScript. You will practice working with **strings**, **regular expressions** and using **built-in functions** (`concat()`, `trim()`, `split()`…). In some of the exercises you might need to combine both in order to find the best solution.

Text Processing and String Manipulation

1. Split a String with a Delimiter

Write a JS function that **splits** a **string** with a given **delimiter**.

The **input** comes as **2 string arguments**. The **first one is the string** you need to split and the **second one is the delimiter**.

The **output** should consist of all elements you've received, after you've **split the given string** by **the given delimiter**. Each element should be printed on a new line.

Examples

Input	Output
`'One-Two-Three-Four-Five', '-'`	One Two Three Four Five

Input	Output
`'http://platform.softuni.bg', '.'`	http://platform softuni bg

Hints

- This "`main`" function will hold all of the code of our solution.

```
function main(string, delimiter){

}
```

- Now that we have the string and the delimiter, we can split the string and save the split elements we received as result to the action we did.

```
let splittedElements = string.split(delimiter);
```

- The `split()` function returns an array of elements, which we can iterate over. The last thing we need to do is print each of the elements on a new line.

```
for(let i = 0; i < splittedElements.length; i++) {
    console.log(splittedElements[i]);
}
```

2. Repeat a String N Times

Write a JS function that repeats a given string, N times.

The **input** comes as **2 arguments**. The **first argument is a string that** will represent **the one you need to repeat**. The second one is a **number** will represent **the times you need to repeat it**.

The **output** is a big string, containing the **given one**, **repeated N times**.

Examples

Input	Output
`'repeat', 5`	`repeatrepeatrepeatrepeatrepeat`

Input	Output
`'magic is real', '3'`	`magic is realmagic is realmagic is real`

Hints

- You can easily use **string concatenation** to solve this problem.
- You could, however, see if there is a **built-in function** that does the same thing.

3. Check if String starts with a given Substring.

Write a JS function that checks if a **given string**, **starts with a given substring**.

The **input** comes as **2 string arguments**. The **first string** will represent **the main one**. The second one will represent **the substring**.

The **output** is either "**`true`**" or "**`false`**" based on the result of the check.
The comparison is **case-sensitive**!

Examples

Input	Output
`'How have you been?', 'how'`	`false`

Input	Output
`'The quick brown fox…', 'The quick brown fox…'`	`true`

Input	Output
`'Marketing Fundamentals, starting 19/10/2016', 'Marketing Fundamentals, sta'`	`true`

4. Check if String ends with given Substring.

Write a JS function that checks if a **given string**, **ends with a given substring**.

The **input** comes as **2 string arguments**. The **first string** will represent **the main one**. The second one will represent **the substring**.

The **output** is either "**`true`**" or "**`false`**" based on the result of the check.
The comparison is **case-sensitive**!

Examples

Input	Output
'This sentence ends with fun?', 'fun?'	true

Input	Output
'This is Houston, we have…', 'We have…'	false

Input	Output
'The new iPhone has no headphones jack.', 'o headphones jack.'	true

5. *Capitalize the Words

Write a JS function that capitalizes the given words. You need to make **every word**'s **first letter** – **uppercase** and **all other letters** – **lowercase**.

The **input** comes as a **single string**, containing words, separated by a space.

The **output** is the same string, however with all of its words capitalized.

Note: The words can contain **any ASCII character**. You need to **affect only the letters**.

Examples

Input	Output
'Capitalize these words'	Capitalize These Words

Input	Output
'Was that Easy? tRY thIs onE for SiZe!'	Was That Easy? Try This One For Size!

Working with Regular Expressions

For the following tasks, it will be most appropriate, if you use regular expressions in your solutions.

6. Capture the Numbers

Write a JS function that **finds all numbers** in a sequence of strings.

The **input** comes as **array of strings**. Each element represents one of the strings.

The **output** is all the numbers, **extracted** and **printed on a single line** – each separated by a **single space**.

Examples

Input	Output
['The300', 'What is that?', 'I think it's the 3rd movie.', 'Lets watch it at 22:45']	300 3 22 45

Input	Output
['123a456', '789b987', '654c321', '0']	123 456 789 987 654 321 0

Input	Output
['Let's go11!!!11!', 'Okey!1!']	11 11 1

Hints

We can solve this problem in multiple ways; first let's see the more complex way in order to understand how the regex actually works:

- We receive several sentences in the form of an array of strings. Let's create a variable named text, and gather all the sentences into one big string. Also, we need to initialize our regex pattern, and an array that will hold the numbers we found.

```
let numbers = [];
let regex = /\d+/g;
let text = "";
```

- We create the needed things. The regex is "**\d+**" which will catch **one or more consecutive digits**. We also give it a global modifier, "**g**", which will prevent the regex from returning on the first match.
- We can now proceed with combining all the strings into one big string.

```
for(let i = 0; i < input.length; i++) {
    let currentSentence = input[i];
    text += currentSentence;
}
```

- Now that we have that, we can proceed to the main thing. The matching.

```
let match = regex.exec(text);

while(match) {
    numbers.push(match[0]);
    match = regex.exec(text);
}
```

- First we create a **match** variable which will hold our matches. The regex **anchors itself** every time, to the index of the match it has found, thus to iterate all matches we need a **while** loop. Every time we **match something**, we **push it** to the array of numbers… The match variable represents an **array of all groups it has found**, so we just take the first element, which represents the **whole match**. Then we match again, to **move the anchor**.
- Last but not least, we print the result:

```
console.log(numbers.join(" "));
```

Now that we understand how the matching works underneath, we can actually write a simpler solution. Having learned the Array built-in functions we know we can group the input into one string using the **Array.join()** function:

```
let text = input.join(' ');
```

The regex we'll use will be the same:

```
let regex = /\d+/g;
```

In case we don't need capturing subgroups, as it is in this problem, we can just use the **String.match()** function to get all matches from our string (the regex still has to have the global flag **"g"**).

```
let numbers = text.match(regex);
```

Thus we managed to write the program in just a few lines:

```
let text = input.join(' ');
let regex = /\d+/g;
let numbers = text.match(regex);
console.log(numbers.join(' '));
```

7. Find Variable Names in Sentences

Write a JS function that finds all **variable names** in a given string. A variable name starts with an **underscore** (**"_"**) and contains **only Capital and Non-Capital English Alphabet letters and digits**. Extract only their names, **without the underscore.** Try to do this **only with regular expressions**.

The **input** comes as **single string**, on which you have to perform the matching.

The **output** consists of all variable names, **extracted** and **printed on a single line**, each **separated** by a **comma**.

Input	Output
'The _id and _age variables are both integers.'	id,age

Input	Output
'Calculate the _area of the _perfectRectangle object.'	area,perfectRectangle
Input	**Output**
'__invalidVariable _evenMoreInvalidVariable_ _validVariable'	validVariable

Hints

- Think how to ensure that your match is a separate word (not part of a bigger word that may be invalid).
- Think of a way to ensure your regex matches only the variable and not parts before/after it. Check the special characters online to see if one of them fits your needs.

8. Find Occurrences of Word in Sentence

Write a JS function that finds, **how many times** a **given word**, is **used** in a **given sentence.** Note that letter case does not matter – it is **case-insensitive**.

The **input** comes as **2 string arguments**. The **first one** will be the **sentence**, and the **second one** – the **word**.

The **output** is a single number indicating the **amount of times** the sentence contains the word.

Examples

Input	Output
'The waterfall was so high, that the child couldn't see its peak.', 'the'	2

Input	Output
'How do you plan on achieving that? How? How can you even think of that?', 'how'	3
Input	**Output**
'There was one. Therefore I bought it. I wouldn't buy it otherwise.', 'there'	1

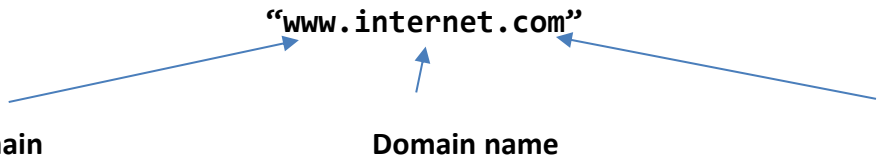
Hints

- Remember how we always used the global modifier **"g"**. There is also a modifier for case-insensitive matching. It might help you since the case does **NOT** matter in this problem.

- Think how to create a regex that includes a string that will be known only at runtime. It is important to note that there is a Regex constructor that accepts a string representing the regex pattern.

9. *Extract the Links

Write a JS function that **extracts links** from a **given text**. The text will come in the form of strings, each representing a sentence. You need to extract **only the valid links** from it. Example:



Sub-Domain **Domain name** **Domain extension**

The **Sub-Domain** must always be “**www**”. The **Domain name** can consist of English alphabet letters (**uppercase** and **lowercase**), digits and dashes (“**-**“). The **Domain extension** consists of one or more **domain blocks**, a **domain block** consists of a **dot** followed by **one or more lowercase** English alphabet **letters**, a **Domain extension** must have at least **one domain block** in order to be **valid**. The Sub-Domain and Domain name must be separated by a single **dot**. Any link that **does NOT follow** the specified above rules should be treated as **invalid**.

Example incorrect links:

- "**ww**.justASite.bg"
- "**lel**.awesome.com"
- "www.stamat_gosho.hit.bg"
- "www.no-symb**#^**ols-allow**%**ed.com"
- "www.pesho**.12**"
- "www.gosho-site**.**"
- "www.example-site**._*^#**"

Example correct links:

- "Some textwww.softuni.bg"
- "Just a link in a www.sea-of-text.bg-swimming around"
- "Instruments www.Instruments.rom.com.trombone2000 Instrument here"
- "All your ice cream flavors-www.scream.for.ice.cream(We also have squirrels)"

The **input** comes as **array of strings**. Each element represents a sentence.

The **output** is all valid links you’ve found, printed – each on a new line.

Examples

Input	Output
['Join WebStars now for free, at www.web-stars.com', 'You can also support our partners:',	www.web-stars.com www.internet.com www.webspiders101.com

'Internet - www.internet.com', 'WebSpiders - www.webspiders101.com', 'Sentinel - www.sentinel.-ko']	

Input	Output
['Need information about cheap hotels in London?', 'You can check us at www.london-hotels.co.uk!', 'We provide the best services in London.', 'Here are some reviews in some blogs:', '"London Hotels are awesome!" - www.indigo.bloggers.com', '"I am very satisfied with their services" - ww.ivan.bg', '"Best Hotel Services!" - www.rebel21.sedecrem.moc']	www.london-hotels.co.uk www.indigo.bloggers.com www.rebel21.sedecrem.moc

Hints

- Sites such as https://regex101.com/ can be very helpful, when designing regular expressions.

10. **Secret Data

Write a JS function that hides essential client data from secret documents that went public. You have to hide people's names, phone numbers, ids and secret base names.

- The **names of the clients** will be preceded by a single **asterisk** ("*****"), they will always be **exactly one word**, they will contain **only English alphabet letters**, they will **start with a capital letter** and they will always be followed by either a **space,** a **tabulation** or the **end of the string**. Anything else is **NOT to be considered** as a name.

- The **phone numbers** of the clients will be preceded by a single **plus sign** ("**+**") and will consist of exactly 10 symbols. The phone numbers can consist only of **digits** and **dashes** and they will always be followed by a **space, tabulation** or the **end of the string**. Anything else is **NOT to be considered** as a phone number.

- The **ID**s of the clients will be preceded by a single **exclamation mark** ("**!**"). The IDs of the clients will consist only of **Lowercase** and **Uppercase English alphabet letters** and **digits** and they will always be followed by a **space, tabulation** or the **end of the string**. Anything else is **NOT to be considered** as an ID.

- The **names of the secret bases** will be preceded by a single **underscore** ("**_**") and will consist only of **Uppercase** and **Lowercase English alphabet letters** and **digits** and they will always be followed

by a **space, tabulation** or the **end of the string**. Anything else is **NOT to be considered** as a secret base name.

Constraints

- **Usernames, phone numbers, IDs and names of secret bases** can start glued to other text.
- **Usernames, phone numbers, IDs and names of secret bases** will never be split given across 2 lines.
- **Usernames, phone numbers, IDs and names of secret bases** will always have a **space, tabulation** or the **end of the string** after them.

The **input** comes as an **array of strings**. Each string represents a sentence of the secret document. You need to find every **client data element** that is supposed to be secret, and **hide it**, by **replacing it** with a **string of vertical bars** ("**|**") with the **same length**, as the **discovered element**.

NOTE: The preceding symbol counts towards the discovered element's length when deciding how many pipes to use to cover it.

The **output** should be the same document, with the sensitive **client data replaced by pipes**. See the example for more info.

Example

Input	Output
['Agent *Ivankov was in the room when it all happened.', 'The person in the room was heavily armed.', 'Agent *Ivankov had to act quick in order.', 'He picked up his phone and called some unknown number.'] ['I think it was +555-49-796', 'I can't really remember...', 'He said something about "finishing work"', 'with subject !2491a23BVB34Q and returning to Base _Aurora21', 'Then after that he disappeared from my sight.', 'As if he vanished in the shadows.', 'A moment, shorter than a second, later, I saw the person flying off the top floor.', 'I really don't know what happened there.', 'This is all I saw, that night.', 'I cannot explain it myself...']	Agent ||||||| was in the room when it all happened. The person in the room was heavily armed. Agent ||||||| had to act quick in order. He picked up his phone and called some unknown number. I think it was |||||||||| I can't really remember... He said something about "finishing work" with subject ||||||||||||| and returning to Base |||||||| Then after that he disappeared from my sight. As if he vanished in the shadows. A moment, shorter than a second, later, I saw the person flying off the top floor. I really don't know what happened there. This is all I saw, that night. I cannot explain it myself...