Lab: Regular Expressions JavaScript

1. Match Full Name

Write a JavaScript Program to **match full names** from a list of names and **print** them on the console.

Writing the Regular Expression

First, write a regular expression to match a valid full name, according to these conditions:

- A valid full name has the following characteristics:
  - It consists of **two words**.
  - Each word **starts** with a **capital letter**.
  - After the first letter, it **only contains lowercase letters afterwards**.
  - **Each** of the **two words** should be **at least two letters long**.
  - The **two words** are **separated** by a **single space**.

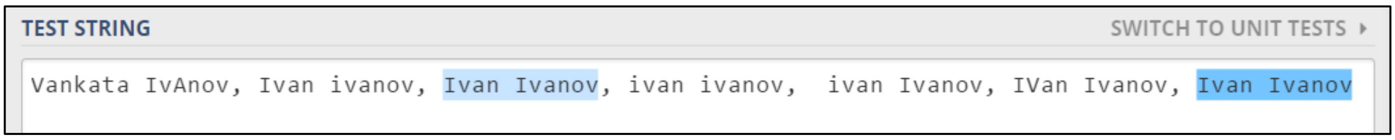
To help you out, we've outlined several steps:

1. Use an online regex tester like https://regex101.com/
2. Check out how to use **character sets** (denoted with square brackets - **"[]"**)
3. Specify that you want **two words** with a space between them (the **space character** `' '`, and **not** any whitespace symbol)
4. For each word, specify that it should begin with an uppercase letter using a **character set**. The desired characters are in a range – **from 'A' to 'Z'**.
5. For each word, specify that what follows the first letter are only **lowercase letters**, one or more – use another character set and the correct **quantifier**.
6. To prevent capturing of letters across new lines, put **"\b"** at the beginning and at the end of your regex. This will ensure that what precedes and what follows the match is a word boundary (like a new line).

In order to check your RegEx, use these values for reference (paste all of them in the **Test String** field):

Match ALL of these	Match NONE of these
`Ivan Ivanov`	`ivan ivanov, Ivan ivanov, ivan Ivanov, IVan Ivanov, Ivan IvAnov, Ivan  Ivanov`

By the end, the matches should look something like this:

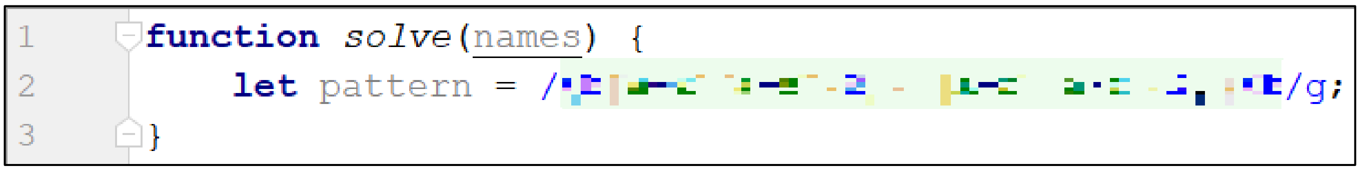


```
Vankata IvAnov, Ivan ivanov, Ivan Ivanov, ivan ivanov,  ivan Ivanov, IVan Ivanov, Ivan Ivanov
```

After you've constructed your regular expression, it's time to write the solution in JavaScript.

Implementing the Solution in JavaScript

Create a new JavaScript file and copy your **regular expression** into a variable:



```
function solve(names) {
    let pattern = /[redacted]/g;
}
```

Note: You should put **"/"** before and after the pattern so that it is interpreted as a RegEx pattern. Also, place the **'g'** (global) flag after it, so that you get all the matches in the text.

Now, it's time to **read the input**, to **extract the matches** from it and push them into an array. For this we can use **exec()**:

```
let validNames = [];

while ((validName = pattern.exec(names)) !== null) {
    validNames.push(validName[0]);
}
```

The **exec** method matches the string and the pattern keeps the first index after the match. This way the next time **exec** runs it starts looking after the last match. If there are no more matches, it will return **null**.

We are declaring a variable in the while loop's condition because we need to check every time if there are any more matches.

Now we have an array (**validNames**), which holds all of the valid names in the input. All that is left is to **join** it by **space** and **print** it (do this by using **join()**):

```
console.log(validNames.join(' '));
```

Examples

Input
"Ivan Ivanov, Ivan ivanov, ivan Ivanov, IVan Ivanov, Test Testov, Ivan Ivanov"
Output
Ivan Ivanov Test Testov

2. Match Phone Number

Write a regular expression to match a **valid phone number** from **Sofia**. After you find all **valid phones**, **print** them on the console, separated by a **comma and a space ", "**.

Compose the Regular Expression

A valid number has the following characteristics:

- It starts with **"+359"**
- Then, it is followed by the area code (always **2**)
- After that, it's followed by the **number** itself:
    - The number consists of **7 digits** (separated in **two groups** of **3** and **4 digits** respectively).
- The different **parts** are **separated** by **either a space or a hyphen** (**'-'**).

You can use the following RegEx properties to **help** with the matching:

- Use **quantifiers** to match a **specific number** of **digits**
- Use a **capturing group** to make sure the delimiter is **only one of the allowed characters (space or hyphen)** and **not** a **combination** of both (e.g. **+359 2-111 111** has **mixed delimiters**, it is **invalid**). Use a **group backreference** to achieve this.

- Add a **word boundary** at the **end** of the match to avoid **partial matches** (the last example on the right-hand side).
- Ensure that before the `'+'` sign there is either a **space** or the **beginning of the string**.

You can use the following table of values to test your RegEx against:

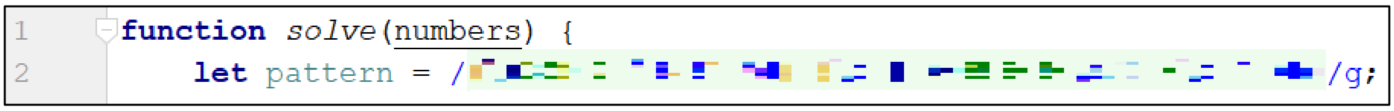
Match ALL of these	Match NONE of these

`+359 2 222 2222`
`+359-2-222-2222`
	`359-2-222-2222, +359/2/222/2222, +359-2 222 2222`
	`+359 2-222-2222, +359-2-222-222, +359-2-222-22222`

Implement the Solution in JavaScript

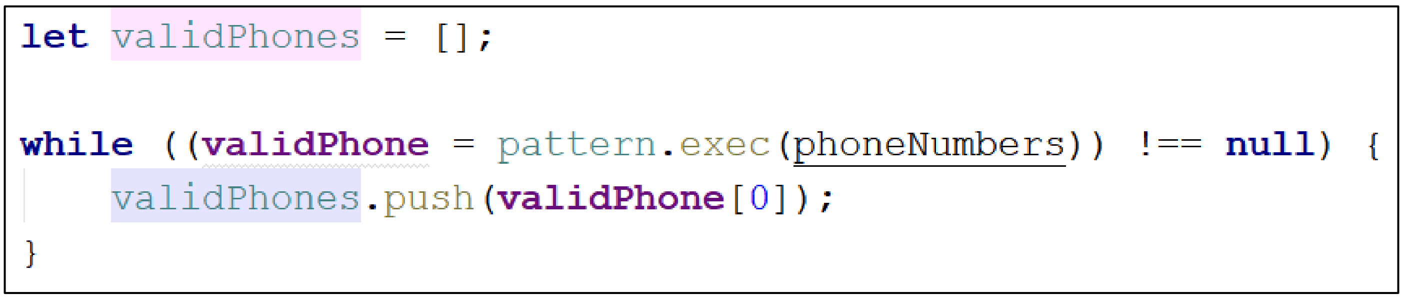
Now it's time to write the solution, so let's start writing!

First, just like in the previous problem, put your RegEx in a variable:



```
function solve(numbers) {
    let pattern = /[redacted]/g;
```

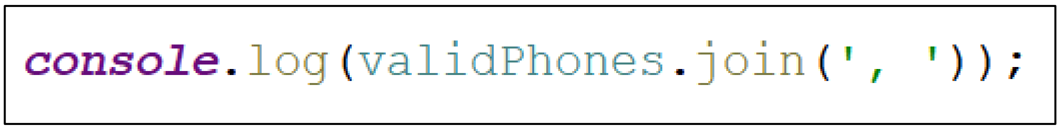
After that, let's make an array of matches using like in the previous exercise:



```
let validPhones = [];

while ((validPhone = pattern.exec(phoneNumbers)) !== null) {
    validPhones.push(validPhone[0]);
}
```

Now let's print **all the matches**, separated by **", "**:



```
console.log(validPhones.join(', '));
```

Examples

Input
`"+359 2 222 2222,359-2-222-2222, +359/2/222/2222, +359-2 222 2222 +359 2-222-2222, +359-2-222-222, +359-2-222-22222 +359-2-222-2222"`
Output
`+359 2 222 2222, +359-2-222-2222`

3. Match Dates

Write a program, which matches a date in the format **`"dd{separator}MMM{separator}yyyy"`**.

Compose the Regular Expression

Every valid date has the following characteristics:

- Always starts with **two digits**, followed by a **separator**
- After that, it has **one uppercase** and **two lowercase** letters (e.g. **`Jan`**, **`Mar`**).

- After that, it has a **separator** and **exactly 4 digits** (for the year).
- The separator could be either of three things: a period (**"."**), a hyphen (**"-"**) or a forward slash (**"/"**)
- The separator needs to be **the same** for the whole date (e.g. 13**.**03**.**2016 is valid, 13**.**03**/**2016 is **NOT**). Use a **group backreference** to check for this.

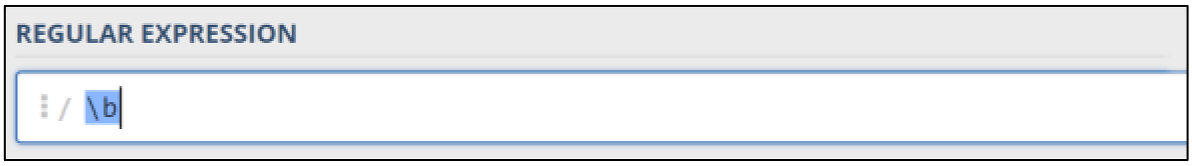
You can follow the table below to help with composing your RegEx:

Match ALL of these	Match NONE of these
`13/Jul/1928, 10-Nov-1934, 25.Dec.1937`	`01/Jan-1951, 23/sept/1973, 1/Feb/2016`

Use **named capturing groups** for the **day**, **month** and **year**.

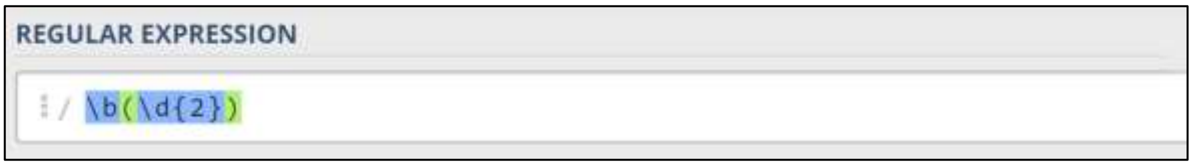
Since this problem requires more complex RegEx, which includes **named capturing groups**, we'll take a look at how to construct it:

- First off, we don't want anything at the **start** of our date, so we're going to use a **word boundary "\b"**:



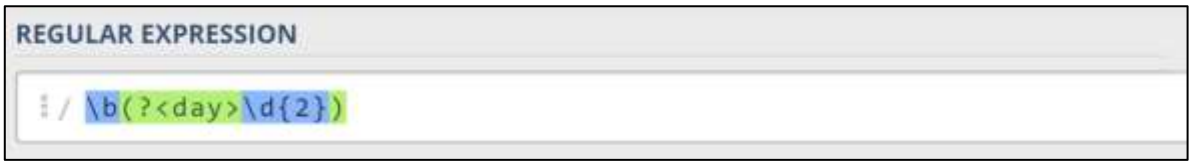
```
\b
```

- Next, we're going to match the **day**, by telling our RegEx to match **exactly two digits**, and since we want to **extract** the day from the match later, we're going to put it in a **capturing group**:



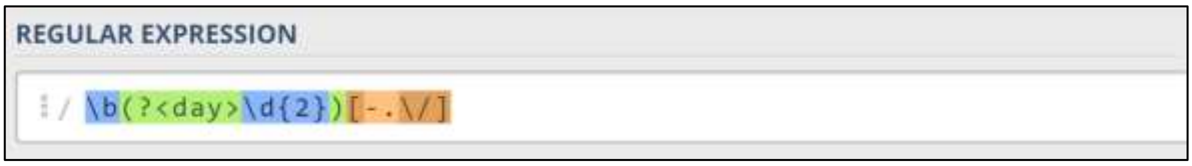
```
\b(\d{2})
```

We're also going to give our group a **name**, since it's easier to navigate by **group name** than by **group index**:



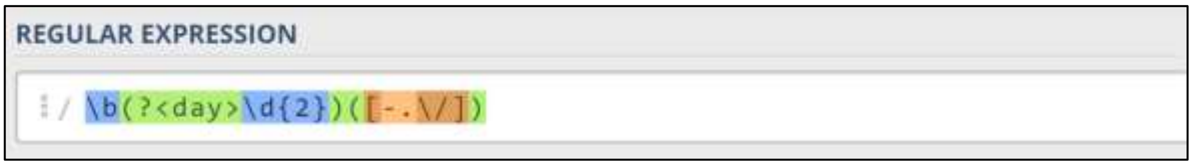
```
\b(?<day>\d{2})
```

- Next comes the separator – either a **hyphen**, **period** or **forward slash**. We can use a **character class** for this:



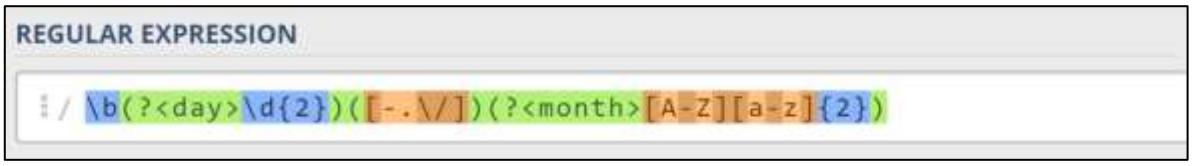
```
\b(?<day>\d{2})[-.\/]
```

Since we want to use the separator we matched here to match the **same separator** further into the date, we're going to put it in a **capturing group**:



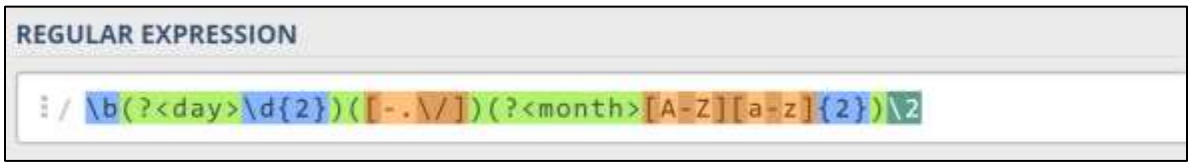
```
\b(?<day>\d{2})([-.\/])
```

- Next comes the **month**, which consists of a **capital Latin letter** and **exactly two lowercase Latin letters**:



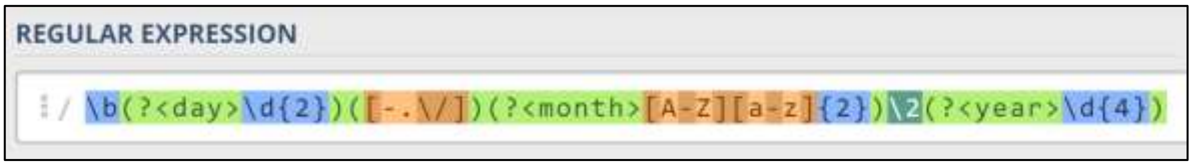
```
\b(?<day>\d{2})([-.\/])(?<month>[A-Z][a-z]{2})
```

- Next, we're going to match the **same separator we matched earlier**. We can use a **backreference** for that:



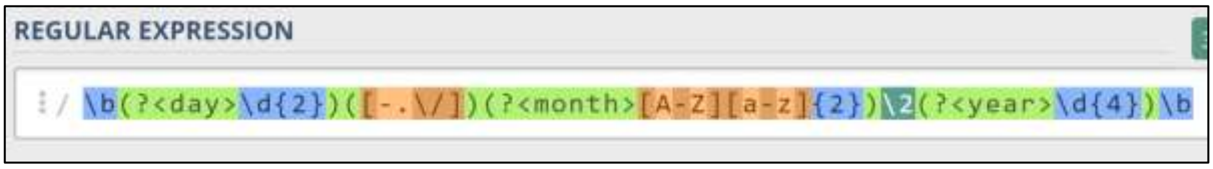
```
/ \b(?<day>\d{2})([-.\/])(?<month>[A-Z][a-z]{2})\2
```

- Next up, we're going to match the year, which consists of **exactly 4 digits**:



```
/ \b(?<day>\d{2})([-.\/])(?<month>[A-Z][a-z]{2})\2(?<year>\d{4})
```

- Finally, since we don't want to match the date if there's anything else **glued to it**, we're going to use another **word boundary** for the end:

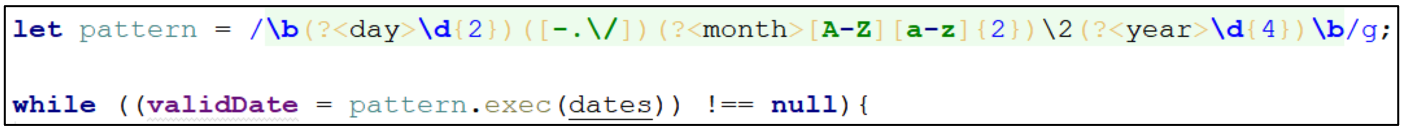


```
/ \b(?<day>\d{2})([-.\/])(?<month>[A-Z][a-z]{2})\2(?<year>\d{4})\b
```

Now it's time to find all the **valid dates** in the input and **print each date** in the following format: **`"Day: {day}, Month: {month}, Year: {year}"`**, each on a **new line**.

Implement the Solution in JavaScript

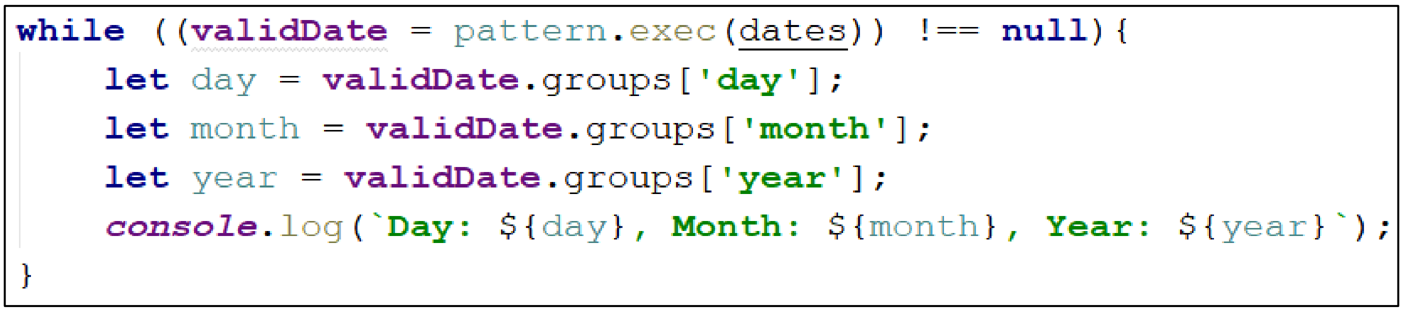
First off, we're going to put our RegEx in a variable and get the matches from the string:



```javascript
let pattern = /\b(?<day>\d{2})([-.\/])(?<month>[A-Z][a-z]{2})\2(?<year>\d{4})\b/g;

while ((validDate = pattern.exec(dates)) !== null){
```

Next, we're going to **iterate** over every single **element** in the array and **extract** the **day**, **month** and **year** by making new patterns and matching them:



```javascript
while ((validDate = pattern.exec(dates)) !== null){
    let day = validDate.groups['day'];
    let month = validDate.groups['month'];
    let year = validDate.groups['year'];
    console.log(`Day: ${day}, Month: ${month}, Year: ${year}`);
}
```

Examples

Input
`"13/Jul/1928, 10-Nov-1934, , 01/Jan-1951,f 25.Dec.1937 23/09/1973, 1/Feb/2016"`
Output

`Day: 13, Month: Jul, Year: 1928`
`Day: 10, Month: Nov, Year: 1934`
`Day: 25, Month: Dec, Year: 1937`

4. Match Numbers

Write a program, which finds all **integer** and **floating-point numbers** in a string.

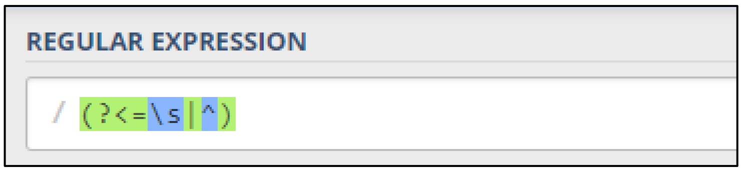
Compose the Regular Expression

A number has the following characteristics:

- Has either **whitespace** before it or the **start** of the string (match either ^ or what's called a positive lookbehind). The entire syntax for the **beginning** of your **RegEx** might look something like **"(^|(?<=\s))"**.
- The number might or might not be negative, so it might have a hyphen on its left side (**"-"**).
- Consists of **one or more digits**.
- Might or might not have **digits after the decimal point**
- The decimal part (if it exists) consists of a period (**"."**) and **one or more digits** after it. Use a **capturing group**.
- Has either **whitespace** before it or the **end** of the string (match either **$** or what's called a positive lookahead). The syntax for the **end** of the **RegEx** might look something like **"($|(?=\s))"**.

Let's see how we would translate the above rules into a **regular expression**:

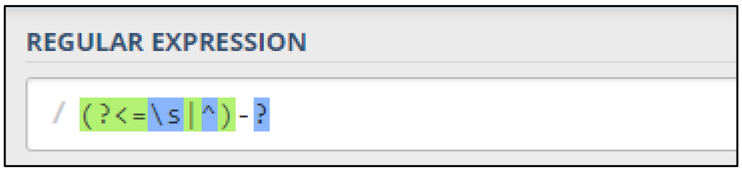
- First off, we need to establish what needs to exist **before** our number. We can't use **"\b"** here, since it includes **"-"**, which we need to match **negative numbers**.
  Instead, we'll use a **positive lookbehind**, which **matches** if there's something **immediately behind** it. We'll match if we're either at the **start** of the string (^), or if there's any **whitespace behind** the string:



REGULAR EXPRESSION

```
/ (?<=\s|^)
```

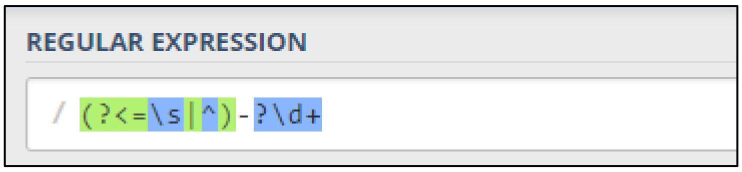
- Next, we'll check whether there's a **hyphen**, signifying a **negative number**:



REGULAR EXPRESSION

```
/ (?<=\s|^)-?
```

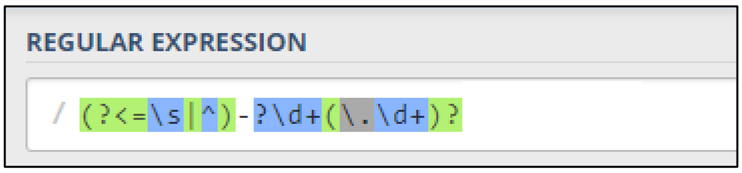
  Since having a negative sign **isn't required**, we'll use the **"?"** quantifier, which means "**between 0 and 1 times**".
- After that, we'll match any integers – naturally, consisting **one or more digits**:



REGULAR EXPRESSION

```
/ (?<=\s|^)-?\d+
```

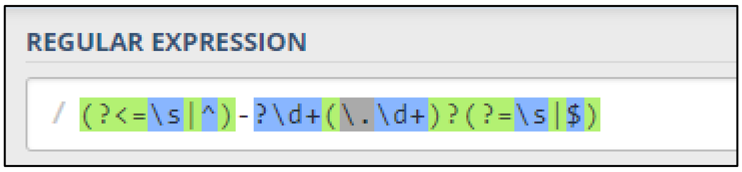
- Next, we'll match the **decimal** part of the number, which **might or might not exist** (note: we need to escape the **period** character, as it's used for something else in RegEx):



REGULAR EXPRESSION

```
/ (?<=\s|^)-?\d+(\.\d+)?
```

- Finally, we're going to use the same logic for the end of our string as the start – we're going to match **only** if the number has **either a whitespace or the end of the string ("$")**:



```
/ (?<=\s|^)-?\d+(\.\d+)?(?=\s|$)
```

You can follow the table below to help with composing your RegEx:

Match ALL of these	Match NONE of these
`1 -1 123 -123 123.456 -123.456`	`1s s2 s-s -1- _55_ s-2 s-3.5 s-1.1`

Find all the **numbers** from the string and **print them** on the **console**, separated by **spaces**.

Implement the Solution in JavaScript

Now that we've written our regular expression, we can start by putting it in an array containing all the matches:

```
let pattern = /(?<=\s|^)-?\d+(\.\d+)?(?=\s|$)/g;

let validNumbers = [];

while ((validNumber = pattern.exec(numbers)) !== null) {
    validNumbers.push(validNumber[0]);
}
```

After that, it's only a matter of printing the numbers, separated by spaces:

```
console.log(validNumbers.join(' '));
```

Examples

Input	Output
`"1 -1 1s 123 s-s -123 _55_ _f 123.456 -123.456 s-1.1 s2 -1- zs-2 s-3.5"`	`1 -1 123 -123 123.456 -123.456`