



Python RegEx

[< Previous](#)[Next >](#)

A RegEx, or Regular Expression, is a sequence of characters that forms a search pattern.

RegEx can be used to check if a string contains the specified search pattern.

RegEx Module

Python has a built-in package called `re`, which can be used to work with Regular Expressions.

Import the `re` module:

```
import re
```

RegEx in Python

When you have imported the `re` module, you can start using regular expressions:

Example

Search the string to see if it starts with "The" and ends with "Spain":

```
import re

txt = "The rain in Spain"
x = re.search("^The.*Spain$", txt)
```

[Try it Yourself »](#)

RegEx Functions

The `re` module offers a set of functions that allows us to search a string for a match:

Function	Description
<code>findall</code>	Returns a list containing all matches
<code>search</code>	Returns a <u>Match object</u> if there is a match anywhere in the string
<code>split</code>	Returns a list where the string has been split at each match
<code>sub</code>	Replaces one or many matches with a string

Metacharacters

Metacharacters are characters with a special meaning:

Character	Description	Example	Try it
<code>[]</code>	A set of characters	<code>"[a-m]"</code>	Try it »
<code>\</code>	Signals a special sequence (can also be used to escape special characters)	<code>"\d"</code>	Try it »
<code>.</code>	Any character (except newline character)	<code>"he..o"</code>	Try it »
<code>^</code>	Starts with	<code>"^hello"</code>	Try it »
<code>\$</code>	Ends with	<code>"planet\$"</code>	Try it »
<code>*</code>	Zero or more occurrences	<code>"he.*o"</code>	Try it »
<code>+</code>	One or more occurrences	<code>"he.+o"</code>	Try it »
<code>?</code>	Zero or one occurrences	<code>"he.?o"</code>	Try it »
<code>{}</code>	Exactly the specified number of occurrences	<code>"he.{2}o"</code>	Try it »
<code> </code>	Either or	<code>"falls stays"</code>	Try it »
<code>()</code>	Capture and group		

Special Sequences

A special sequence is a `\` followed by one of the characters in the list below, and has a special meaning:

Character	Description	Example	Try it
<code>\A</code>	Returns a match if the specified characters are at the beginning of the string	<code>"\AThe"</code>	Try it »
<code>\b</code>	Returns a match where the specified characters are at the beginning or at the end of a word (the "r" in the beginning is making sure that the string is being treated as a "raw string")	<code>r"\bain"</code> <code>r"ain\b"</code>	Try it » Try it »
<code>\B</code>	Returns a match where the specified characters are present, but NOT at the beginning (or at the end) of a word (the "r" in the beginning is making sure that the string is being treated as a "raw string")	<code>r"\Bain"</code> <code>r"ain\B"</code>	Try it » Try it »
<code>\d</code>	Returns a match where the string contains digits (numbers from 0-9)	<code>"\d"</code>	Try it »
<code>\D</code>	Returns a match where the string DOES NOT contain digits	<code>"\D"</code>	Try it »
<code>\s</code>	Returns a match where the string contains a white space character	<code>"\s"</code>	Try it »
<code>\S</code>	Returns a match where the string DOES NOT contain a white space character	<code>"\S"</code>	Try it »
<code>\w</code>	Returns a match where the string contains any word characters (characters from a to Z, digits from 0-9, and the underscore <code>_</code> character)	<code>"\w"</code>	Try it »
<code>\W</code>	Returns a match where the string DOES NOT contain any word characters	<code>"\W"</code>	Try it »
<code>\Z</code>	Returns a match if the specified characters are at the end of the string	<code>"Spain\Z"</code>	Try it »

Sets

A set is a set of characters inside a pair of square brackets `[]` with a special meaning:

Set	Description	Try it
<code>[arn]</code>	Returns a match where one of the specified characters (<code>a</code> , <code>r</code> , or <code>n</code>) is present	Try it »
<code>[a-n]</code>	Returns a match for any lower case character, alphabetically between <code>a</code> and <code>n</code>	Try it »
<code>[^arn]</code>	Returns a match for any character EXCEPT <code>a</code> , <code>r</code> , and <code>n</code>	Try it »
<code>[0123]</code>	Returns a match where any of the specified digits (<code>0</code> , <code>1</code> , <code>2</code> , or <code>3</code>) are present	Try it »

[0-9]	Returns a match for any digit between 0 and 9	Try it »
[0-5][0-9]	Returns a match for any two-digit numbers from 00 and 59	Try it »
[a-zA-Z]	Returns a match for any character alphabetically between a and z , lower case OR upper case	Try it »
[+]	In sets, + , * , . , , () , \$, { } has no special meaning, so [+] means: return a match for any + character in the string	Try it »

The findall() Function

The `findall()` function returns a list containing all matches.

Example

Print a list of all matches:

```
import re

txt = "The rain in Spain"
x = re.findall("ai", txt)
print(x)
```

[Try it Yourself »](#)

The list contains the matches in the order they are found.

If no matches are found, an empty list is returned:

Example

Return an empty list if no match was found:

```
import re

txt = "The rain in Spain"
x = re.findall("Portugal", txt)
print(x)
```

[Try it Yourself »](#)

The search() Function

The `search()` function searches the string for a match, and returns a Match object if there is a match.

If there is more than one match, only the first occurrence of the match will be returned:

Example

Search for the first white-space character in the string:

```
import re

txt = "The rain in Spain"
x = re.search("\s", txt)

print("The first white-space character is located in position:", x.start())
```

Try it Yourself »

If no matches are found, the value `None` is returned:

Example

Make a search that returns no match:

```
import re

txt = "The rain in Spain"
x = re.search("Portugal", txt)
print(x)
```

Try it Yourself »

The split() Function

The `split()` function returns a list where the string has been split at each match:

Example

Split at each white-space character:

```
import re

txt = "The rain in Spain"
x = re.split("\s", txt)
print(x)
```

[Try it Yourself »](#)

You can control the number of occurrences by specifying the `maxsplit` parameter:

Example

Split the string only at the first occurrence:

```
import re

txt = "The rain in Spain"
x = re.split("\s", txt, 1)
print(x)
```

[Try it Yourself »](#)

The sub() Function

The `sub()` function replaces the matches with the text of your choice:

Example

Replace every white-space character with the number 9:

```
import re

txt = "The rain in Spain"
x = re.sub("\s", "9", txt)
print(x)
```

[Try it Yourself »](#)

You can control the number of replacements by specifying the `count` parameter:

Example

Replace the first 2 occurrences:

```
import re

txt = "The rain in Spain"
x = re.sub("\s", "9", txt, 2)
print(x)
```

[Try it Yourself »](#)

Match Object

A Match Object is an object containing information about the search and the result.

Note: If there is no match, the value `None` will be returned, instead of the Match Object.

Example

Do a search that will return a Match Object:

```
import re

txt = "The rain in Spain"
x = re.search("ai", txt)
print(x) #this will print an object
```

[Try it Yourself »](#)

The Match object has properties and methods used to retrieve information about the search, and the result:

`.span()` returns a tuple containing the start-, and end positions of the match.

`.string` returns the string passed into the function

`.group()` returns the part of the string where there was a match

Example

Print the position (start- and end-position) of the first match occurrence.

The regular expression looks for any words that starts with an upper case "S":

```
import re

txt = "The rain in Spain"
x = re.search(r"\bS\w+", txt)
print(x.span())
```

[Try it Yourself »](#)

Example

Print the string passed into the function:

```
import re

txt = "The rain in Spain"
x = re.search(r"\bS\w+", txt)
print(x.string)
```

[Try it Yourself »](#)

Example

Print the part of the string where there was a match.

The regular expression looks for any words that starts with an upper case "S":

```
import re

txt = "The rain in Spain"
x = re.search(r"\bS\w+", txt)
print(x.group())
```

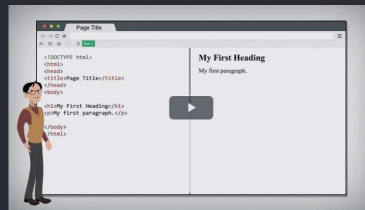
[Try it Yourself »](#)

Note: If there is no match, the value `None` will be returned, instead of the Match Object.

[◀ Previous](#)[Next >](#)

NEW

We just launched
W3Schools videos



Explore now

COLOR PICKER

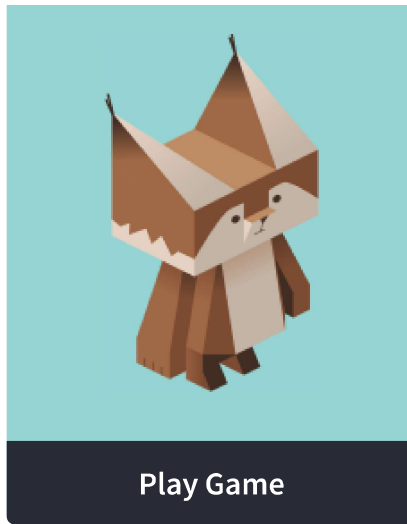


Get certified
by completing
a Python
course today!



Get started

CODE GAME

[Report Error](#)[Spaces](#)[Pro](#)[Get Certified](#)

Top Tutorials

- [HTML Tutorial](#)
- [CSS Tutorial](#)
- [JavaScript Tutorial](#)
- [How To Tutorial](#)
- [SQL Tutorial](#)
- [Python Tutorial](#)
- [W3.CSS Tutorial](#)
- [Bootstrap Tutorial](#)
- [PHP Tutorial](#)
- [Java Tutorial](#)
- [C++ Tutorial](#)
- [jQuery Tutorial](#)

Top Examples

- [HTML Examples](#)
- [CSS Examples](#)
- [JavaScript Examples](#)
- [How To Examples](#)
- [SQL Examples](#)
- [Python Examples](#)
- [W3.CSS Examples](#)
- [Bootstrap Examples](#)
- [PHP Examples](#)
- [Java Examples](#)
- [XML Examples](#)
- [jQuery Examples](#)

Top References

- [HTML Reference](#)
- [CSS Reference](#)
- [JavaScript Reference](#)
- [SQL Reference](#)
- [Python Reference](#)
- [W3.CSS Reference](#)
- [Bootstrap Reference](#)
- [PHP Reference](#)
- [HTML Colors](#)
- [Java Reference](#)
- [Angular Reference](#)
- [jQuery Reference](#)

Get Certified

- [HTML Certificate](#)
- [CSS Certificate](#)
- [JavaScript Certificate](#)
- [Front End Certificate](#)
- [SQL Certificate](#)
- [Python Certificate](#)
- [PHP Certificate](#)
- [jQuery Certificate](#)
- [Java Certificate](#)
- [C++ Certificate](#)
- [C# Certificate](#)
- [XML Certificate](#)

[FORUM](#) | [ABOUT](#)

W3Schools is optimized for learning and training. Examples might be simplified to improve reading and learning. Tutorials, references, and examples are constantly reviewed to avoid errors, but we cannot warrant full correctness of all content. While using W3Schools, you agree to have read and accepted our terms of use, cookie and privacy policy.

W3Schools is Powered by W3.CSS.

