

# Basic Regular Expressions in R

## Cheat Sheet

### Character Classes

<code>[[:digit:]]</code> or <code>\\d</code>	Digits; <code>[0-9]</code>
<code>\\D</code>	Non-digits; <code>[^0-9]</code>
<code>[[:lower:]]</code>	Lower-case letters; <code>[a-z]</code>
<code>[[:upper:]]</code>	Upper-case letters; <code>[A-Z]</code>
<code>[[:alpha:]]</code>	Alphabetic characters; <code>[A-z]</code>
<code>[[:alnum:]]</code>	Alphanumeric characters <code>[A-z0-9_]</code>
<code>\\w</code>	Word characters; <code>[A-z0-9_]</code>
<code>\\W</code>	Non-word characters
<code>[[:xdigit:]]</code> or <code>\\x</code>	Hexadec. digits; <code>[0-9A-Fa-f]</code>
<code>[[:blank:]]</code>	Space and tab
<code>[[:space:]]</code> or <code>\\s</code>	Space, tab, vertical tab, newline, form feed, carriage return
<code>\\S</code>	Not space; <code>[^[:space:]]</code>
<code>[[:punct:]]</code>	Punctuation characters; <code>!"#\$%&amp;'()*+,-./:;&lt;=&gt;?@[\\]^_`{ }~</code>
<code>[[:graph:]]</code>	Graphical char.; <code>[[:alnum:]][[:punct:]]</code>
<code>[[:print:]]</code>	Printable characters; <code>[[:alnum:]][[:punct:]]\\s</code>
<code>[[:cntrl:]]</code> or <code>\\c</code>	Control characters; <code>\\n, \\r</code> etc.

### Special Metacharacters

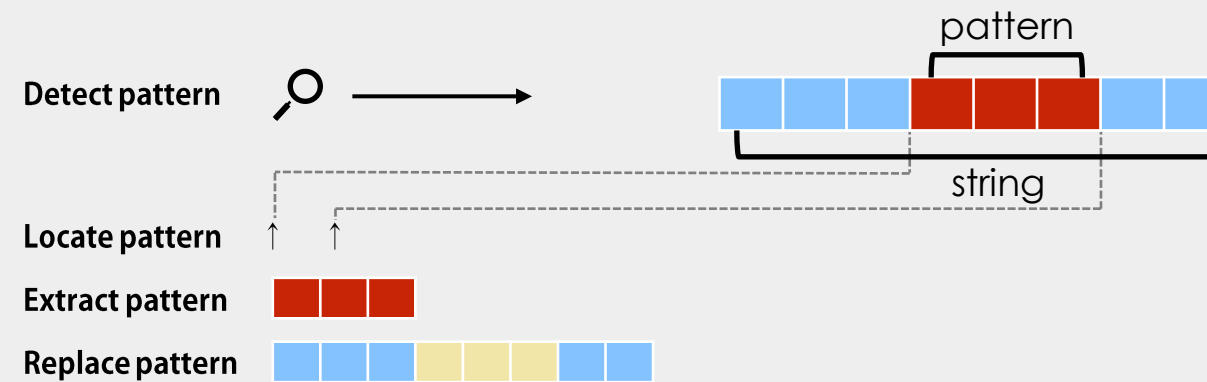
<code>\\n</code>	New line
<code>\\r</code>	Carriage return
<code>\\t</code>	Tab
<code>\\v</code>	Vertical tab
<code>\\f</code>	Form feed

### Lookaraounds and Conditionals\*

<code>(?=)</code>	Lookahead (requires <code>PERL = TRUE</code> ), e.g. <code>(?=yx)</code> : position followed by 'xy'
<code>(?!)</code>	Negative lookahead ( <code>PERL = TRUE</code> ); position NOT followed by pattern
<code>(?&lt;=)</code>	Lookbehind ( <code>PERL = TRUE</code> ), e.g. <code>(?&lt;=yx)</code> : position following 'xy'
<code>(?&lt;!)</code>	Negative lookbehind ( <code>PERL = TRUE</code> ); position NOT following pattern
<code>?(if)then</code>	If-then-condition ( <code>PERL = TRUE</code> ); use lookaheads, optional char. etc in if-clause
<code>?(if)then else</code>	If-then-else-condition ( <code>PERL = TRUE</code> )

\*see, e.g. <http://www.regular-expressions.info/lookaround.html>  
<http://www.regular-expressions.info/conditional.html>

## Functions for Pattern Matching



```
> string <- c("Hiphopotamus", "Rhymenoceros", "time for bottomless lyrics")
> pattern <- "t.m"
```

### Detect Patterns

```
grep(pattern, string)
[1] 1 3

grep(pattern, string, value = TRUE)
[1] "Hiphopotamus"
[2] "time for bottomless lyrics"

grepl(pattern, string)
[1] TRUE FALSE TRUE

stringr::str_detect(string, pattern)
[1] TRUE FALSE TRUE
```

### Split a String using a Pattern

`strsplit(string, pattern)` or `stringr::str_split(string, pattern)`

### Locate Patterns

```
regexpr(pattern, string)
find starting position and length of first match

gregexpr(pattern, string)
find starting position and length of all matches

stringr::str_locate(string, pattern)
find starting and end position of first match

stringr::str_locate_all(string, pattern)
find starting and end position of all matches
```

### Extract Patterns

```
regmatches(string, regexpr(pattern, string))
extract first match [1] "tam" "tim"

regmatches(string, gregexpr(pattern, string))
extracts all matches, outputs a list
[[1]] "tam" [[2]] character(0) [[3]] "tim" "tom"

stringr::str_extract(string, pattern)
extract first match [1] "tam" NA "tim"

stringr::str_extract_all(string, pattern)
extract all matches, outputs a list

stringr::str_extract_all(string, pattern, simplify = TRUE)
extract all matches, outputs a matrix

stringr::str_match(string, pattern)
extract first match + individual character groups

stringr::str_match_all(string, pattern)
extract all matches + individual character groups
```

### Replace Patterns

```
sub(pattern, replacement, string)
replace first match

gsub(pattern, replacement, string)
replace all matches

stringr::str_replace(string, pattern, replacement)
replace first match

stringr::str_replace_all(string, pattern, replacement)
replace all matches
```

### Character Classes and Groups

<code>.</code>	Any character except <code>\\n</code>
<code> </code>	Or, e.g. <code>(a b)</code>
<code>[...]</code>	List permitted characters, e.g. <code>[abc]</code>
<code>[a-z]</code>	Specify character ranges
<code>[^...]</code>	List excluded characters
<code>(...)</code>	Grouping, enables back referencing using <code>\\N</code> where <code>N</code> is an integer

### Anchors

<code>^</code>	Start of the string
<code>\$</code>	End of the string
<code>\\b</code>	Empty string at either edge of a word
<code>\\B</code>	NOT the edge of a word
<code>\\&lt;</code>	Beginning of a word
<code>\\&gt;</code>	End of a word

### Quantifiers

<code>*</code>	Matches at least 0 times
<code>+</code>	Matches at least 1 time
<code>?</code>	Matches at most 1 time; optional string
<code>{n}</code>	Matches exactly n times
<code>{n,}</code>	Matches at least n times
<code>{,n}</code>	Matches at most n times
<code>{n,m}</code>	Matches between n and m times

### General Modes

By default R uses *POSIX extended regular expressions*. You can switch to *PCRE regular expressions* using `PERL = TRUE` for base or by wrapping patterns with `perl()` for `stringr`.

All functions can be used with literal searches using `fixed = TRUE` for base or by wrapping patterns with `fixed()` for `stringr`.

All base functions can be made case insensitive by specifying `ignore.cases = TRUE`.

### Escaping Characters

Metacharacters (`.` `*` `+` etc.) can be used as literal characters by escaping them. Characters can be escaped using `\\` or by enclosing them in `\\Q...\\E`.

### Case Conversions

Regular expressions can be made case insensitive using `(?i)`. In backreferences, the strings can be converted to lower or upper case using `\\L` or `\\U` (e.g. `\\L\\1`). This requires `PERL = TRUE`.

### Greedy Matching

By default the asterisk `*` is greedy, i.e. it always matches the longest possible string. It can be used in lazy mode by adding `?`, i.e. `*?`.

Greedy mode can be turned off using `(?U)`. This switches the syntax, so that `(?U)a*` is lazy and `(?U)a*?` is greedy.

### Note

Regular expressions can conveniently be created using `rex::rex()`.