

Numeric Functions and Operators in R

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Functions

In R, the operations that do all the work are called functions. R has a large number of in-built functions and the user can create their own functions. Most functions are in the following form:

`f(argument1, argument2,...)`

Where `f` is the name of the function, and `argument1`, `argument2`, ... are the arguments to the function.

In this tutorial we will be discussing General and Statistical Built-in Functions of R.

General Functions

Note: 'x' here is a numeral or a vector of numerals.

```
#Absolute value of 'x'
```

```
abs(-4)
```

```
[1] 4
```

```
abs(c(-4,4.5,-10.5,6))
```

```
[1] 4.0 4.5 10.5 6.0
```

```
#Square Root of 'x'
```

```
sqrt(81)
```

```
[1] 9
```

```
#Rounds to the nearest integer that's larger than x
```

```
ceiling(445.67)
```

```
[1] 446
```

```
#Rounds to the nearest integer that's smaller than x
```

```
floor(445.67)
```

```
[1] 445
```

General Functions

Note: 'x' here is a numeral or a vector of numerals.

```
#Rounds to the nearest integer toward 0.
```

```
trunc(445.67)
```

```
[1] 445
```

```
trunc(c(445.67,19.567,33.09))
```

```
[1] 445 19 33
```

```
#Rounds to the nearest possible value after mentioning ho many digits  
#to keep after decimal point.
```

```
round(44.5682,digits=2)
```

```
[1] 44.57
```

```
#specify the number of significant digits to be retained
```

```
signif(44.5681,digits=4)
```

```
[1] 44.57
```

Similar to round() function, signif() also specify number of significant digits regardless of the size of the number.

General Functions

Note: 'x' here is a numeral or a vector of numerals.

```
#Computes natural logarithms.
```

```
log(50)
```

```
[1] 3.912023
```

```
log(c(44,55))
```

```
[1] 3.784190 4.007333
```

```
#Computes binary (base 2) logarithm.
```

```
log2(8)
```

```
[1] 3
```

```
#Computes logarithm to the base 10.
```

```
log10(55)
```

```
[1] 1.740363
```

```
#Computes the exponential value , ex.
```

```
exp(6)
```

```
[1] 403.4288
```

Operators

An operator is a symbol which helps the user to command the compiler to perform specific mathematical or logical operations. R language is rich in built-in operators and are classified into the following categories:

- Assignment Operators
- Arithmetic Operators
- Relational Operators
- Logical Operators
- Miscellaneous Operators

Assignment Operators

These operators are used to assign values to objects.

#Left Assignment (<-, <<-, =) can be done in 3 ways:

```
x1<-45
```

```
x1=45
```

```
x1<<-45
```

```
x1
```

```
[1] 45
```

#Right Assignment (->, ->>) can be done in 2 ways

```
45->y1
```

```
45->>y1
```

```
y1
```

```
[1] 45
```

Different assignments
all leading to same
output

Arithmetic Operators

These operators are used to perform mathematical operations like addition and multiplication. Here is a list of arithmetic operators available in R.

```
x<-7  
y<-18
```

```
#Addition
```

```
x+y  
[1] 25
```

```
#Subtraction
```

```
x-y  
[1] -11
```

```
#Multiplication
```

```
x*y  
[1] 126
```

Arithmetic Operators

#Division

y/x

[1] 2.571429

#Exponentiation

y^x

[1] 612220032

#Integer Division to get Remainder

$y\%x$

[1] 4

#Integer Division to get Quotient

$y\%/%x$

[1] 2

Relational Operators

These operators are used to compare values. The result of the comparison is the Boolean (True or False) value. Following table shows the relational operators available in R.

```
x<-7  
y<-18
```

```
#Less than
```

```
x<y  
[1] TRUE
```

```
#Greater than
```

```
x>y  
[1] FALSE
```

```
#Less than or equal to
```

```
x<=5  
[1] FALSE
```

Relational Operators

```
#Greater than or equal to  
y>=20  
[1] FALSE
```

```
#Equal to  
y==16  
[1] FALSE
```

```
#Not equal to  
x!=5  
[1] TRUE
```

Logical Operators

Logical Operators are applicable only to vectors of logical or numeric type. They compare each element of the first vector with the corresponding element of the second vector. Below table describes the logical operators available in R with different expressions & their respective outcomes :

Expression	Outcome	Expression	Outcome
true AND true	TRUE	true OR true	TRUE
true AND false	FALSE	true OR false	TRUE
false AND false	FALSE	false OR false	FALSE
true AND missing	missing	true OR missing	TRUE
missing AND missing	missing	missing OR missing	missing
false AND missing	FALSE	false OR missing	missing

0 means False & any number >0 is True

Logical Operators

Below table describes the logical operators available in R.

```
x<-c(FALSE,TRUE,2,5)
y<-c(TRUE,FALSE,FALSE,TRUE)
```

```
#Logical NOT
```

```
!x
[1] TRUE FALSE FALSE FALSE
```

```
#Element-wise logical AND
```

```
x&y
[1] FALSE FALSE FALSE TRUE
```

Logical Operators

`&&` and `||` examines only the first element of the vector resulting into single length logical vector.

```
#Logical AND  
x&& y  
[1] FALSE
```

```
#Element-wise logical OR  
x|y  
[1] TRUE TRUE TRUE TRUE
```

```
#Logical OR  
x||y  
[1] TRUE
```

Miscellaneous Operators

These operators are used for specific purpose and not general mathematical or logical operations.

#Colon operator.

```
x<-1:5
```

```
x
```

```
[1] 1 2 3 4 5
```

It creates simple integer sequences

```
x<-10
```

```
t<-1:8
```

```
x%in%t
```

```
[1] FALSE
```

This operator is used to identify if a value belongs to a vector or array

Quick Recap

In this session, we learnt different types of Functions and Operators in R. Here is a quick recap:

General Functions

- `abs()`, `sqrt()`, `ceiling()`, `floor()`, `trunc()`, `signif()`, `log()`, `log2()`, `log10()`, `exp()`

Operators

- Assignment Operators: `<-`, `<<-`, `=`, `->`, `->>`
- Arithmetic Operators: `+`, `-`, `*`, `/`, `^`, `%%`, `/%`
- Relational Operators: `<`, `>`, `<=`, `>=`, `==`, `!=`
- Logical Operators: `!`, `&`, `&&`, `|`, `||`
- Miscellaneous Operators: `%in%`, `:`