

MATH 205: Statistical methods

Lab 1: Working with R

- Goals:
 - Give a quick overview on the working of R
 - Set up the foundation to create and manipulate datasets
- This is an ambitious goal. R has a very wide range of structures and functions.
- Focus on the ones that would be directly related to the class. All other things would come up eventually.

- simpleR:

<https://cran.r-project.org/doc/contrib/Verzani-SimpleR.pdf>

- Learning-by-examples:

<https://www.learnbyexample.org/r-operators/>

Today's tasks

- Basic R operators
- Representing data by vectors

Basic R operators

Basic R operators

- Assignment operator
- Arithmetic operators
- Comparison operators
- Logical operators

Arithmetic operators

Operator	Meaning	Example
+	Addition	$x + y$
-	Subtraction	$x - y$
*	Multiplication	$x * y$
/	Division	x / y
%%	Modulus	$x \% y$
^	Exponents	$x ^ y$
%/%	Integer division	$x \% / y$

Comparison operator

Comparison operators are used to compare two values or vectors.

Operator	Meaning	Example
<code>==</code>	Equal to	<code>x == y</code>
<code>!=</code>	Not equal to	<code>x != y</code>
<code>></code>	Greater than	<code>x > y</code>
<code><</code>	Less than	<code>x < y</code>
<code>>=</code>	Greater than or equal to	<code>x >= y</code>
<code><=</code>	Less than or equal to	<code>x <= y</code>

Logical operators

Logical operators are used to join two or more conditions.

Operator	Description	Example
<code>&&</code>	Returns True if both statements are true	<code>x > 0 && y < 0</code>
<code> </code>	Returns True if one of the statements is true	<code>x > 0 y < 0</code>
<code>!</code>	Reverses the result, returns False if the result is true	<code>!(x > 0 && y < 0)</code>

Representing data by vector

Representing data by vector

- A vector is a collection of elements, all the same type
- There are several ways to create a new vector
- The simplest is to use the `c()` function

Calculate Basic Statistics

You can calculate basic statistics by using below simple R functions.

Statistic	Function
mean	mean(x)
median	median(x)
standard deviation	sd(x)
variance	var(x)
correlation	cor(x, y)
covariance	cov(x, y)

Other way of creating vector

- The `:` operator
- The `rep()` Function

Manipulating vector

- Modify vector elements
- Add to a vector
- Combine multiple vectors
- Vector arithmetic
- find the length of a vector