

# MATH 205: Statistical methods

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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>&gt;</code>	Greater than	<code>x &gt; y</code>
<code>&lt;</code>	Less than	<code>x &lt; y</code>
<code>&gt;=</code>	Greater than or equal to	<code>x &gt;= y</code>
<code>&lt;=</code>	Less than or equal to	<code>x &lt;= y</code>



# Logical operators

Logical operators are used to join two or more conditions.

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