### **Matrices**

In this lesson, we will discuss matrices.

# We'll cover the following Creating Matrices Why Do We Need Matrices If We Have Arrays? Syntax Accessing and Manipulating Matrices

Matrices are R objects where elements are arranged in a **two-dimensional** rectangular layout.

Like arrays, they contain elements of the same data type.

## Creating Matrices #

A Matrix is created using the matrix() function. The matrix() function takes an atomic vector as input. We can also define how many rows should be in the matrix by setting the nrow argument to a number. Furthermore, we can also set the ncol argument, which tells R how many columns to include in the matrix.

### Why Do We Need Matrices If We Have Arrays? #

Matrices in R language are only 2 dimensional. A matrix is just a more **convenient constructor**. There are many functions and methods especially mathematical and statistical methods that only accept 2D arrays. So, to ensure that the programmer does not make the mistake of making the 2D array an nD array, a convenient object specifically for this task **matrix** is used.

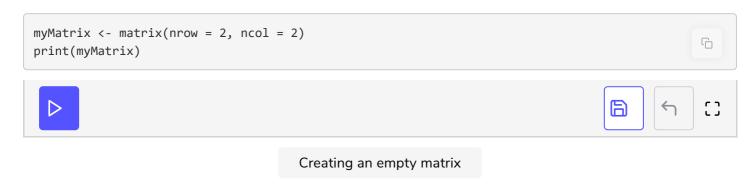
### Syntax #

```
matrix(data, nrow, ncol, byrow, dimnames)
```

Here, data is the input **vector**, **nrow** is the number of rows to be created, **ncol** is the number of columns to be created, **byrow** is a **logical clue**: which if set to **TRUE** 

arranges elements **row-wise** and **dimnames** is the parameter that lets us assign names to the rows and columns.

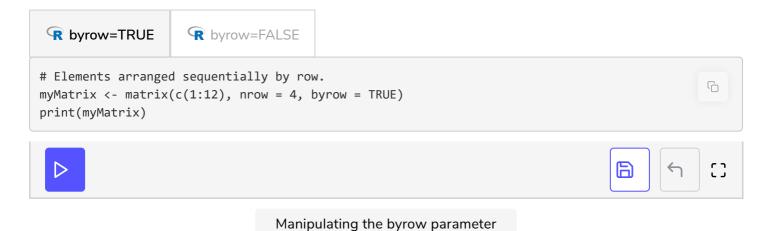
Let's have a look at the code to create an empty matrix:



Let's use a populated vector to create a matrix:



Let's play around with the matrix() function.



We can also set the names of **rows** and **columns**. In the following code snippet, we name rows from r1...r4 and name columns from c1...c3.

```
# Define the column and row names.
rownames = c("r1", "r2", "r3", "r4")
colnames = c("c1", "c2", "c3")
myMatrix <- matrix(c(1:12), nrow = 4, ncol = 3, byrow = TRUE, dimnames = list(rownames, colnames))
print(myMatrix)</pre>
```





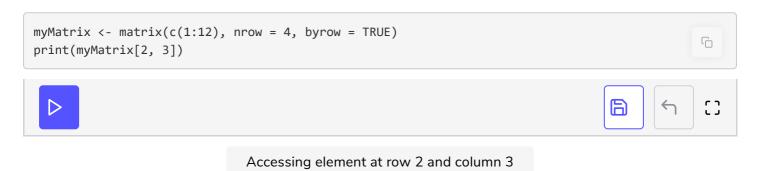


[]

Setting names for rows and columns

# Accessing and Manipulating Matrices #

Elements of a matrix can be accessed and updated by using the row and column index of the element inside square brackets [].



Changing the value of an element in a matrix can be done by first accessing the element using square brackets and then assigning it a different value or by using the column-wise single index.



Let's test your concepts on **arrays and matrices** with a small exercise.