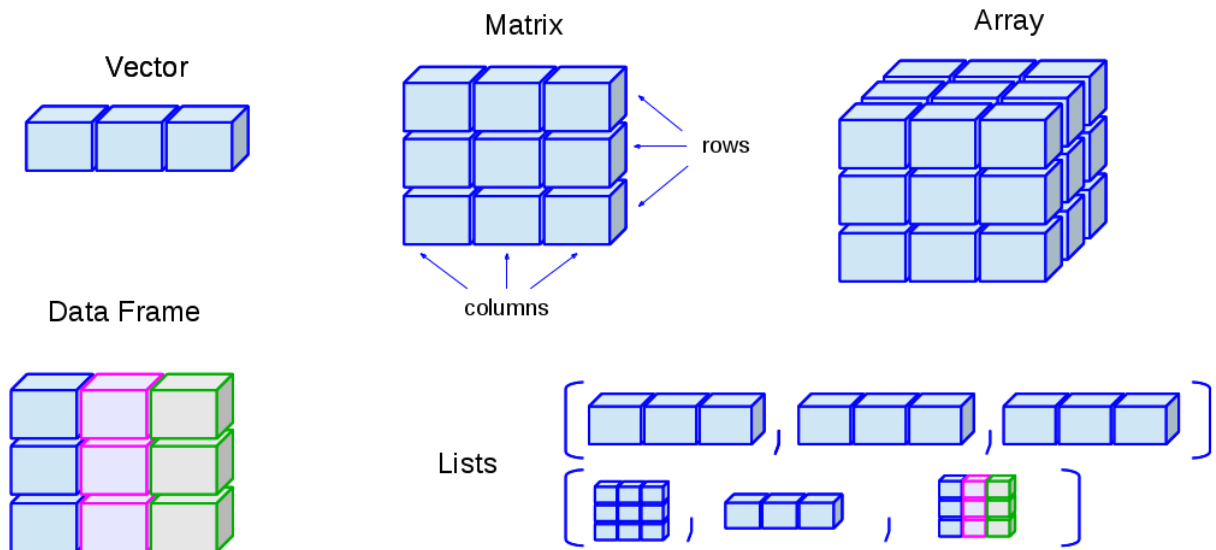# Recap

STA 517 3.0 Programming and Statistical Computing with R

Data structures

- Explicit coercion
- Combining objects
- Name elements
- Subsetting
- tibble and factor
- dataframe vs tibble
- Simplifying vector creations

Simple mathematical and statistical functions

R can be used as a simple calculator.

Operator	Description
+	addition
-	substraction
*	multiplication
^	exponentiation (5^2 is 25)
%%	modulo-remainder of the division of the number to the left by the number on its right. (5%%3 is 2)

Some more maths functions

Operator	Description
abs(x)	absolute value of x
log(x, base=y)	logarithm of x with base y; if base is not specified, returns the natural logarithm
exp(x)	exponential of x
sqrt(x)	square root of x
factorial(x)	factorial of x

Basic statistic functions

Operator	Description
mean(x)	mean of x
median(x)	median of x
mode(x)	mode of x
var(x)	variance of x
scale(x)	z-score of x
quantile(x)	quantiles of x
summary(x)	summary of x: mean, minimum, maximum, etc.

Probability distribution functions

- **d** prefix for the **distribution** function

- **p** prefix for the **cummulative probability**

- **q** prefix for the **quantile**

- **r** prefix for the **random** number generator

Logical operations

|< |less than| |<= |less than or equal to| |> |greater than| |>= |greater than or equal to| |== |exactly equal to| |!= |not equal to | |!x |Not x| |x | y | x OR y| |x & y | x AND y| |isTRUE(x) |test if X is TRUE|

Matrix operations

- Matrix multiplication

- Transpose

- ets

Handling missing observations

```
is.na
```

Writing functions with R

```r
function_name <- function(inputs){

<FUNCTION BODY>

}
```

Programming styles

- base R
- tidyverse
- pipe operator %>%

Import and Export data

- readr functions

Data Visualization

- qplot
- ggplot

Data Transform and Data Wrangling

- `tidyr` and `dplyr` functions

Reproducible reporting

- Rmarkdown

Random number generation

- built-in functions in R
- Inverse transform method

Statistical modelling and Inference

- Regression analysis
- Hypotheses testing

Functionals

- lapply and sapply

- map

- modify

- map_df

The method of Monte Carlo

Bootstrap

You can update this with all the topics we discussed.