

# Vectorization and List Arithmetics



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# Today we are going to learn...

- 1 Vectorization
- 2 Apply a function to some margins of a matrix or an array
- 3 List Arithmetics

# Vectorization

- The traditional `for` and `while` loops
- The concepts of vectorization
- Avoid loops by using vectorization
- What can be vectorized?

# Lab exercises

- Compare the efficiency of a “for” loop and vectorization for calculating element-wise matrix multiplication.
- Hint: `proc.time()`, `replicate()`

## Apply a function to some margins of a matrix or an array

- `apply(X, MARGIN, FUN, ...)`

## List Arithmetics

↪ **Apply a function to the elements of a list**

- `lapply(X, FUN, ...)`
- `rapply(object, f, how = c("unlist","replace", "list"), ...)`

# List Arithmetics

## ↪ Operators with many lists

- `mapply(FUN, ..., MoreArgs = NULL, SIMPLIFY = TRUE, USE.NAMES = TRUE)`
  - `mapply("+", list1, list2, list3, SIMPLIFY = FALSE)`
  - `mapply(function(x, y) abs(x)*log(abs(y)), list1, list2, SIMPLIFY = FALSE)`

## Suggested reading

- Jones (2009): **Chapter 5.4**