

# Lecture III - Packages and Data Management

## Applied Optimization with Julia

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### Quick Recap from last Week

#### Variables and Data Types

- Variables are used to store values
- Assign a value to a variable using the `=` operator
- You can use different data types for variables
- You can change the value of a variable

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#### Tip

You can use the `typeof` function to check the type of a variable.

#### Vectors and Matrices

- Vectors and matrices are used to store multiple values
- You can create a them using the `[]` and `Matrix{}` operators
- Access their elements using square brackets

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#### Tip

You can use the `push!` function to add elements to a vector or the `pop!` function to remove elements from a vector.

#### Comparisons and Logic

- Comparisons are used to compare values
- `==` checks if two values are equal
- `!=` checks if two values are not equal
- `<` checks if one value is smaller than the other
- `>=` checks if one value is greater than or equal to the other
- `&&` checks if two values are true
- `||` checks if at least one of two values is true

## Loops

- Loops are used to repeat code
- `for` loop repeats code for a fixed number of times
- `while` loop repeats code until a condition is met
- `if` statement checks if a condition is true
- `else` executes code if a condition is false
- `elseif` checks if a condition is true and executes if it is

## Scope

- Scope determines where a variable is defined and lives
- `global` keyword defines a global variable
- `local` keyword defines a local variable
- `let` keyword defines a local variable

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### Tip

Global variables usually make your code much slower, if they are not defined as constants. But for this lecture this is not that important.

## Solutions from last Week

- The tutorials from last week will be available on Friday
- You can access them in the project folder on Github
- Click on the little cat icon on the bottom right

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### Tip

You can ask questions anytime in class or via email!

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## Five Tutorials for this Week

### Topics of the Tutorials

- Functions: Learn how to define and use functions
- Packages: Learn how to install and use packages
- DataFrames: Learn how to work with tabular data in Julia
- IO: Learn how to read and write data in Julia
- Plots: Learn how to create plots in Julia

### Get started with the tutorials

- Download this weeks tutorials and start with the first one
- Remember, you can ask questions anytime!

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**i** And that's it for this lecture!

The remaining time we will already start working on the problems of the third lecture.

## Literature

### Literature

- Lauwens, B., & Downey, A. B. (2019). Think Julia: How to think like a computer scientist (First edition). O'Reilly®. [Link to the free book website](#).
- [Julia Documentation](#)

For more interesting literature to learn more about Julia, take a look at the [literature list](#) of this course.

## Bibliography