

# Lecture 4: Commands and Calculations in R

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## Overview

- In this lecture, we'll explore:
  - How to **type commands** into the R console.
  - Performing **basic calculations** in R.
  - Storing **numeric values** in **variables**.
  - Using R as a **calculator** for arithmetic operations.

## 1. Typing Commands in the R Console

- **What is the R Console?**
  - The **Console Panel** in RStudio is where you can directly type and execute R commands.
  - You can use the console to quickly run **commands** and view their **output**.
- **Example: Printing a message:**
  - In the console, try typing the following command to print a message:

```
print("Hello, World!")
```

```
[1] "Hello, World!"
```

## 2. Doing Basic Calculations in R

- **Using R as a calculator:**
  - R can perform basic arithmetic operations just like a calculator.
  - You can add, subtract, multiply, divide, and use exponents directly in the console.
- **Example: Simple arithmetic:**

```
3 + 5 # Addition
```

```
[1] 8
```

```
10 - 4 # Subtraction
```

```
[1] 6
```

```
6 * 7 # Multiplication
```

```
[1] 42
```

```
8 / 2 # Division
```

```
[1] 4
```

```
2^3 # Exponentiation (2 raised to the power of 3)
```

```
[1] 8
```

- **Note:** Comments in R can be written using `#`. Any text following `#` will be ignored by R when executing commands.

## 3. Storing Numbers as Variables

- **What is a variable in R?**
  - A **variable** in R is a way to store a value or result that you can reuse later in your code.
- **Example: Assigning a value to a variable:**

```
x <- 10 # Assign the value 10 to the variable x
y <- 5  # Assign the value 5 to the variable y
```

- **How to use variables:**
  - Once a variable is assigned, you can use it in calculations or other commands.
- **Example: Using variables in calculations:**

```
result <- x + y # Add x and y, store the result in a new variable 'result'
result
```

```
[1] 15
```

- **Important notes:**
  - In R, the assignment operator is `<-`, which assigns a value to a variable.
  - You can view the contents of any variable by typing its name in the console and hitting **Enter**.

## 4. Using Built-in Functions

- **What are functions in R?**
  - **Functions** are predefined operations or procedures that take input, perform specific tasks, and return a result.
  - R includes a vast number of built-in functions for various tasks such as calculations, data manipulation, and statistical analysis.
- **Example: Calculating the square root:**

```
sqrt(25)
```

```
[1] 5
```

- **Example: Finding the sum of a vector:**

```
numbers <- c(1, 2, 3, 4, 5) # Create a vector of numbers
sum(numbers)
```

```
[1] 15
```

- **Additional basic functions:**
  - `mean()` – Calculates the average of a set of numbers.
  - `length()` – Returns the number of elements in a vector or list.
  - `min()` and `max()` – Returns the smallest or largest value from a vector.

## Key Takeaways

- You have learned how to use the R console to run basic commands and calculations.
- R can perform a variety of arithmetic operations, and you can store results in **variables** for reuse.
- Built-in functions, such as `sqrt()` and `sum()`, are powerful tools for performing calculations in R.

## Looking Forward

- In the next lecture, we'll dive deeper into **functions**, exploring how to create your own custom functions and use them to solve more complex problems in R.