R Programming – Week 3–4: Data Types & Structures

1. Atomic Data Types in R

Atomic types are the simplest data types. Every element in an atomic vector must be of the same type.

Numeric

Includes both integers and floating-point numbers.
Example: x <- 3.14

Integer

Whole numbers. Use L to denote.
Example: x <- 5L
Check: is.integer(x)

Character

Text or string data.
Example: name <- "Neo"

Logical

TRUE or FALSE values.
Example: flag <- TRUE

Complex

Numbers with imaginary parts.
Example: z <- 4 + 3i

2. Data Structures in R

Vector

1D collection of elements of the same type.
Example: v <- c(1, 2, 3)

List

Collection of elements of different types.
Example: lst <- list(1, "text", TRUE)

Matrix

2D array with same data type.
Example: mat <- matrix(1:9, nrow = 3)

Array

Multi-dimensional matrix.
Example: arr <- array(1:8, dim = c(2, 2, 2))

Data Frame

Table-like structure, columns can be different types.
Example:
df <- data.frame(
  ID = 1:3,
  Name = c("A", "B", "C"),
  Score = c(80, 90, 85)
)

Factor

Used to store categorical data.
Example: gender <- factor(c("Male", "Female", "Female"))

3. Type Checking

Use these functions to check types:
is.numeric(x)
is.integer(x)
is.character(x)
is.logical(x)
is.complex(x)
is.vector(x)
is.list(x)
is.matrix(x)
is.data.frame(x)
is.factor(x)

4. Type Coercion

a. Automatic Coercion

R converts types automatically if needed:
c(1, "two", TRUE) # All become character

b. Manual Coercion

Use functions to convert:

```
as.numeric("5")     # Converts to 5
as.character(100)   # Converts to "100"
as.logical(1)       # TRUE
```

✅ Quick Tips

• Use str() to inspect structure.
• Use typeof() to get internal type.
• Use class() to get R class of object.