

Exploring Data Structures in R

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Objective

The objective of this assignment is to deepen your understanding of data structures in R by incorporating indexing, updating, and advanced manipulation techniques for vectors, data frames, lists, and matrices.

INSTRUCTIONS: In your own R script file, please complete the following tasks:

1. Vectors:

```
# Create a numeric vector named my_vector containing the numbers 1, 3, 5, 7, and 9.
my_vector <- c(1,3,5,7,9)
my_vector
```

```
## [1] 1 3 5 7 9
```

```
# Extract the third element from my_vector.
my_vector[3]
```

```
## [1] 5
```

```
# Update the second element of my_vector to be twice its original value.
my_vector[2] <- 2*my_vector[2]
my_vector
```

```
## [1] 1 6 5 7 9
```

2. Data Frames:

```
# Create a data frame named student_data with the following columns:
# Student_ID: Numeric vector with student IDs from 1 to 5.
# Name: Character vector with the names of five students (you pick which names!).
# Score: Numeric vector with scores (between 60 and 100) for each student.
```

```
student_data <- data.frame(
  Student_ID = c(1,2,3,4,5),
  Name = c('Rocky', 'Bullwinkle', 'Larry', 'Moe', 'Curly'),
  score = c(65,85,60,70,100)
)
student_data
```

```
##   Student_ID      Name score
## 1          1      Rocky    65
## 2          2 Bullwinkle    85
## 3          3       Larry    60
## 4          4         Moe    70
## 5          5       Curly   100
```

```
# Update the score of the student with ID 3 to 95.
student_data$score[student_data$Student_ID == 3] <- 95
student_data
```

```
##      Student_ID      Name score
## 1           1      Rocky    65
## 2           2 Bullwinkle    85
## 3           3       Larry    95
## 4           4        Moe    70
## 5           5       Curly   100
```

3. Lists:

```
# Create a list named my_list with the following elements:
```

```
# - Element 1: A numeric vector containing the numbers 10, 20, 30.
# - Element 2: A character vector containing the names of three countries.
# - Element 3: A data frame with two columns - City (character vector) and Population (numeric vector)
```

```
my_list <- list(c(10,20,30),c('USA','Canada','Mexico'),
               data.frame(City = c('Washington DC','Ottawa','Mexico City'),
                           Population = c(689545,1017449,9209944)))
my_list
```

```
## [[1]]
## [1] 10 20 30
##
## [[2]]
## [1] "USA"      "Canada" "Mexico"
##
## [[3]]
##           City Population
## 1 Washington DC    689545
## 2      Ottawa    1017449
## 3  Mexico City    9209944
```

```
# Access and print the second element of the character vector within my_list.
```

```
my_list[[2]][2]
```

```
## [1] "Canada"
```

4. Matrices:

```
# Create a 3x3 matrix named my_matrix with random numeric values.
```

```
my_matrix <- matrix(runif(9), nrow = 3, ncol = 3)
my_matrix
```

```
##           [,1]      [,2]      [,3]
## [1,] 0.5690624 0.6207755 0.3119940
## [2,] 0.3526030 0.9281511 0.2634142
## [3,] 0.5700239 0.2585407 0.3682590
```

```
# Extract the last column of my_matrix.
```

```
my_matrix[,3]
```

```
## [1] 0.3119940 0.2634142 0.3682590
```