Programming for Data Science

Lists in R language

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List in R

- it is an ordered collection of components;
- its components may be arbitrary R objects (matrix, vectors, lists, . . .);
- function list() can be used to create lists:

```
> x = c(1 : 4)
> y = rep("ACT", 2)
> k = c(TRUE, TRUE)
> l1 = list(x, y, k)    it creates a list contains three vectors (i.e. x,y,k)
> l1
[[1]]
[1]1 2 3 4

[[2]]
[1]"ACT" "ACT"

[[3]]
[1]TRUE TRUE
```

List in R

- Two lists can be concatenated as follows:

  $> l2 = list(matrix(rnorm(10), nrow = 5), 1 : 10)$
  $> l3 = c(l1, l2)$

- names can be associated with list elements:

  $> names(l1) = c("first", "second", "third")$
  $first
  [1]1 2 3 4

  $second
  [1]"ACT" "ACT"

  $third
  [1]TRUE TRUE

List in R

- We can access the list elements in the following two ways:
  1. how to access the element in first position in the list *l*1 returning a vector

     ```
     > l1[[1]]
     [1]1 2 3 4
     > l1$first
     [1]1 2 3 4
     ```

  2. how to access the first element in the vector in first position in the list *l*1

     ```
     > l1[[1]][1]
     [1]1
     ```

  3. how to return a new list containing the fist vector in the list *l*1

     ```
     > l1[1]
     [[1]]
     [1]1 2 3 4
     ```

Exercises on Lists

- Create the following three vectors and one matrix 2×2:
  1. $X = \{1, 5, 6, 19, 5\}$;
  2. $Y = \{$"HOME", "WOLF", "ROOM", NA$\}$
  3. $Z = \{1.25, 1.50, 1.75, \ldots 10\}$
  4. $M = \{ 2, 3; 4, 5\}$

  and stores them in the list $l1$.

- Give a name to each list element (using names function).

- Use the two different ways to access the 2nd element of the list $l1$.

- Access the 2nd element of the 3rd element of the list $l1$.

- Access the 2nd and 4th elementes of the 1st element of the list $l1$.

Exercises on Lists

- Create the following three vectors and one matrix 2×2:

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  and stores them in the list $l1$.

  $> X = c(1, 5, 6, 19, 5)$
  $> Y = c("HOME", "WOLF", "ROOM", NA)$
  $> Z = seq(1, 10, by = 0.25)$
  $> M = matrix(c(2, 3, 4, 5), nrow = 2)$
  $> l1 = list(X, Y, Z, M)$

Exercises on Lists

- Give a name to each list element (using names function).

```
> names(l1) = c("X","Y","Z","M")
> l1
X
[1]1 5 6 19 5
Y
[1]"HOME" "WOLF" "ROOM" NA
...
...
...
```

Exercises on Lists

- Use the two different ways to access the 2nd element of the list *l1*.

```
> l1[[2]]
[1]"HOME" "WOLF" "ROOM" NA

> l1$Y
[1]"HOME" "WOLF" "ROOM" NA
```

Exercises on Lists

- Access the 2nd element of the 3rd element of the list *l*1.

  ```
  > l1[[3]][2]
  [1]1.25
  ```

Exercises on Lists

- Access the 2nd and 4th elements of the 1st element of the list $l1$.

  ```
  > l1[[1]][c(2, 4)]
  [1]5 19
  ```