

Introduction to R Software

Basics of Calculations

:::

Loops

Shalabh

Department of Mathematics and Statistics

Indian Institute of Technology Kanpur

Control structures in R :

Loops

Repetitive commands are executed by loops

- **for loop**
- **while loop**
- **repeat loop**

1. The for loop

If the number of repetitions is known in advance then a `for()` loop can be used.

Syntax

```
for (name in vector) {commands to be executed}
```

All operations/commands are executed for all these values.

2. The `while()` loop

If the number of loops is not known in before, e.g. when an iterative algorithm to maximize a likelihood function is used, one can use a `while()` loop.

Syntax

```
while(condition){ commands to be executed as  
long as condition is TRUE }
```

If the condition is not true *before entering* the loop, no commands within the loop are executed.

Example

```
> i <- 1  
  
> while (i<5) {  
+   print(i^2)  
+   i <- i+2  
+}  
  
[1] 1  
  
[1] 9
```

The programmer itself has to be careful that the counting variable `i` within the loop is incremented. Otherwise an infinite loop occurs.

 R Console

```
> i <- 1  
> while (i<5) {  
+ print(i^2)  
+ i <- i+2  
+ }  
[1] 1  
[1] 9
```

3. The repeat loop

The repeat loop doesn't test any condition — in contrast to the `while()` loop — *before entering* the loop and also not during the execution of the loop.

Again, the programmer is responsible that the loop terminates after the appropriate number of iterations. For this the `break` command can be used.

Syntax

```
repeat{ commands to be executed }
```

Example:

```
> i <- 1
```

```
> repeat{  
  + print( i^2 )  
  + i <- i+2  
  + if ( i > 10 ) break  
  +}
```

```
[1] 1
```

```
[1] 9
```

```
[1] 25
```

```
[1] 49
```

```
[1] 81
```

```
> i <- 1
> repeat{
+ print( i^2 )
+ i <- i+2
+ if ( i>10 ) break
+ }
[1] 1
[1] 9
[1] 25
[1] 49
[1] 81
```

Example:

Additionally, the command `next` is available, to return to the beginning of the loop (to return to the first command in the loop).

```
> i <- 1

> repeat{
+ i <- i+1
+ if (i < 10) next
+ print(i^2)
+ if (i >= 13) break
+}
[1] 100
[1] 121
[1] 144
[1] 169
```