

# R Warmup - Exercise Sheet - wi19b004

Michael Scheidl

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## 1 Assignment

Create a function `varyvec(a, b)` that returns a list with the following integer vectors: - sequence from `a` to 1 - sequence of all even integers from `a` to 1 - sequence of all odd integers from `a` to 1 - sequence of all squared integers from `a` to 1 - sequence of all integers from `a` to 1, not smaller than `b`

Each list component should be named appropriately. The list should be of class `varyvec`. Implement a print method that for each vector, only prints the first and the last element (separated with `...`) Demonstrate the functions using a small example. Also show the “raw” return value (using `unclass()`). Document all steps in an R-Markdown-notebook and upload the PDF on Moodle.

## 2 Solution

### 2.1 Override Print for varyvec Class

```
print.varyvec <- function(a){  
  lapply(a, custprint)  
}
```

This codeblock overrides the print functionality for Variables of the Class `varyvec`. `lapply` calls the custom function `custprint` for each vector in the list `a`.

## 2.2 Define Function for Custom Output

```
custprint <- function(a){  
  cat(a[1], "...", a[length(a)-1], "\n", sep="")  
}
```

This function is called by the custom `print()` function for the class `varyvec`. It prints the first element of the provided `a` vector with `a[1]` and the last element of the vector with `a[length(a)-1]`. It concatenates “...” in between and a new line at the end, with no separator between via the function `cat()`.

## 2.3 Define varyvec Function as required

```
varyvec <- function(a,b){  
  retlist <- list(seqfromAto1 = a:1, sequevenintfromAto1 = as.integer(subset(a:1L, a:1L %% 2L == 0L)), s  
  class(retlist) <- "varyvec"  
  varyvec <- retlist  
}
```

Defines the Function `varyvec(a, b)` and creates a list of vectors. These are:

- sequence from `a` to 1 with `a:1`
- sequence of all even integers from `a` to 1 with `as.integer(subset(a:1L, a:1L %% 2L == 0L))`
  - The subset ensures, that the modulo of 2 is 0, which are only even numbers
- sequence of all odd integers from `a` to 1 with `as.integer(subset(a:1L, a:1L %% 2L == 1L))`
  - The subset ensures, that the modulo of 2 is 1, which are only odd numbers
- sequence of all squared integers from `a` to 1 with `as.integer((a:1L)^2)`
- sequence of all integers from `a` to 1, not smaller than `b` with `as.integer(subset(a:1L, a:1L > b))`
  - The subset ensures, that no number is smaller than `b` It also sets the class of the list to `varyvec` and returns it.

## 2.4 Show RAW Output of varyvac

```
unclass(varyvec(10L,4L))  
  
## $seqfromAto1  
## [1] 10 9 8 7 6 5 4 3 2 1  
##  
## $sequevenintfromAto1  
## [1] 10 8 6 4 2  
##  
## $seqoddintfromAto1  
## [1] 9 7 5 3 1  
##  
## $seqsquaredintfromAto1  
## [1] 100 81 64 49 36 25 16 9 4 1  
##  
## $seqsquaredintfromAto1smallerB  
## [1] 10 9 8 7 6 5
```

The `unclass()` ensures, that the custom print function isn't called. This Output shows, that the returned list of `varyvec` contains all correct vectors in a named list.

## 2.5 Show functionality

```
returnlist <- varyvec(10L,4L)
returnlist
```

```
## 10...2
## 10...4
## 9...3
## 100...4
## 10...6
```

This codeblock calls the `varyvec(a,b)` function and stores it's return value in the variable `returnlist`. When printing this variable, the overridden print function is executed, which prints only the required output for each vector.