

Foundations of R Software

Lecture 32

Vector Indexing

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Vector Indexing

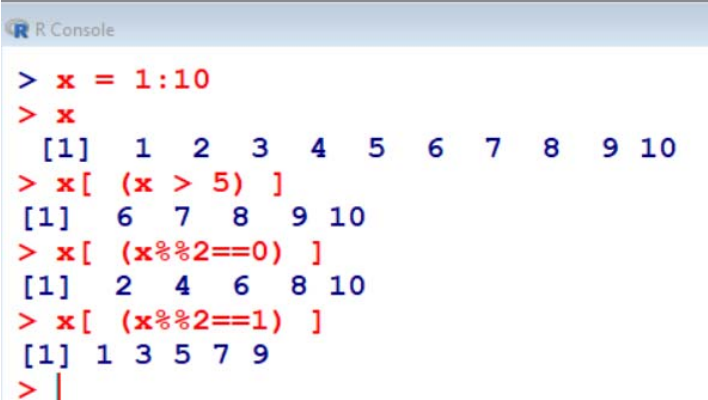
❑ Vector and its values

```
> x = 1:10  
> x  
[1] 1 2 3 4 5 6 7 8 9 10
```

```
> x[ (x > 5) ]  
[1] 6 7 8 9 10
```

```
> x[ (x%%2==0) ] #%% indicates x mod y  
[1] 2 4 6 8 10   #values for which x mod 2 is 0
```

```
> x[ (x%%2==1) ]  
[1] 1 3 5 7 9     #values for which x mod 2 is 1
```



```
R Console  
> x = 1:10  
> x  
[1] 1 2 3 4 5 6 7 8 9 10  
> x[ (x > 5) ]  
[1] 6 7 8 9 10  
> x[ (x%%2==0) ]  
[1] 2 4 6 8 10  
> x[ (x%%2==1) ]  
[1] 1 3 5 7 9  
> |
```

Vector Indexing

❑ Vector with missing observation(s)

```
> x[5] = NA
```

```
> x
```

```
[1] 1 2 3 4 NA 6 7 8 9 10
```

```
> y = x[ !is.na(x) ]  #! Means negation
```

```
> y
```

```
[1] 1 2 3 4 6 7 8 9 10 # 5 is missing
```

```
> mean(x)
```

```
[1] NA
```

```
> mean(y)
```

```
[1] 5.555556
```

Vector Indexing

```
R Console
> x
[1] 1 2 3 4 5 6 7 8 9 10
> x[5] = NA
> x
[1] 1 2 3 4 NA 6 7 8 9 10
> y = x[ !is.na(x) ]
> y
[1] 1 2 3 4 6 7 8 9 10
> mean(x)
[1] NA
> mean(y)
[1] 5.555556
> |
```

Vector Indexing

❑ Vector of negative integers

```
> x = 1:10
```

```
> x
```

```
[1]  1  2  3  4  5  6  7  8  9 10
```

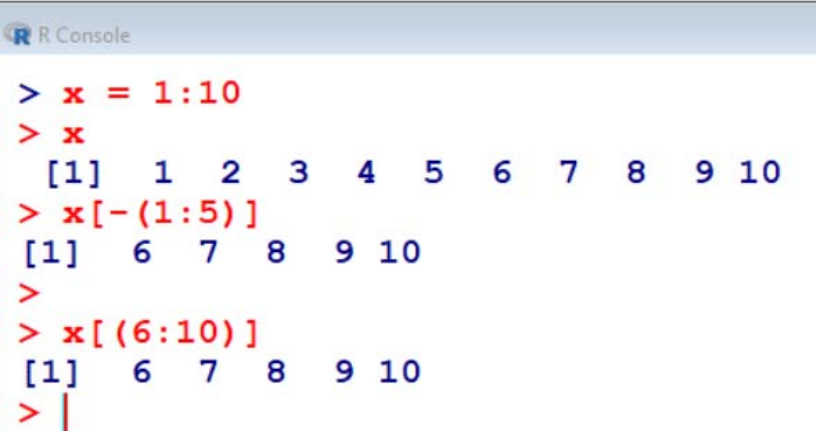
```
> x[-(1:5)]
```

```
[1]  6  7  8  9 10
```

has the same outcome as

```
> x[(6:10)]
```

```
[1]  6  7  8  9 10
```



```
R Console
> x = 1:10
> x
[1]  1  2  3  4  5  6  7  8  9 10
> x[-(1:5)]
[1]  6  7  8  9 10
>
> x[(6:10)]
[1]  6  7  8  9 10
> |
```

❑ String vector

The elements of a vector can be named.

Using these **names**, we can access the vector elements.

names is used for functions to get or set the names of an object

```
> z = list(a1 = 1, a2 = "c", a3 = 1:3)
```

```
> z
```

```
$a1
```

```
[1] 1
```

```
$a2
```

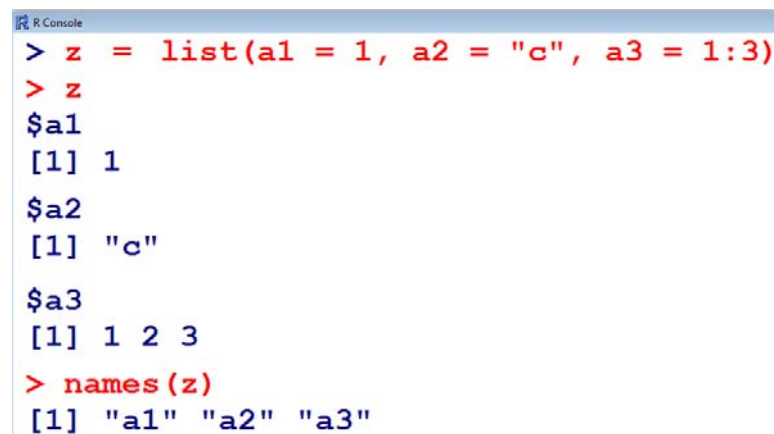
```
[1] "c"
```

```
$a3
```

```
[1] 1 2 3
```

```
> names(z)
```

```
[1] "a1" "a2" "a3"
```



```
R Console
> z = list(a1 = 1, a2 = "c", a3 = 1:3)
> z
$a1
[1] 1

$a2
[1] "c"

$a3
[1] 1 2 3

> names(z)
[1] "a1" "a2" "a3"
```

❑ String vector

Suppose want to change just the name of the third element.

```
> z = list(a1 = 1, a2 = "c", a3 = 1:3)
```

```
> names(z)[3] = "c2"
```

```
> z
```

```
$a1
```

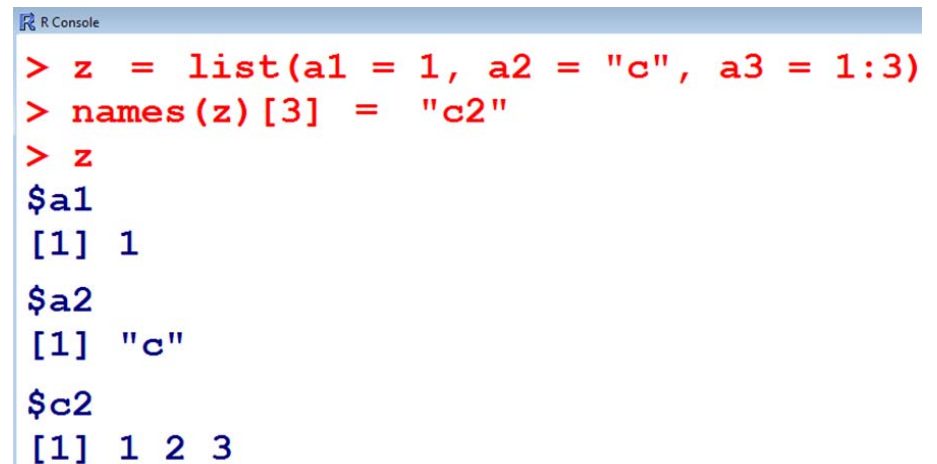
```
[1] 1
```

```
$a2
```

```
[1] "c"
```

```
$c2
```

```
[1] 1 2 3
```



```
R Console
> z = list(a1 = 1, a2 = "c", a3 = 1:3)
> names(z)[3] = "c2"
> z
$a1
[1] 1
$a2
[1] "c"
$c2
[1] 1 2 3
```

❑ String vector

Example

names is used for functions to get or set the names of an object

```
> x = c(water=1, juice=2, lemonade=3 )
```

```
> names(x)
```

```
[1] "water"      "juice"      "lemonade"
```

```
> x["juice"]
```

```
juice  
      2
```

```
R Console  
  
> x = c(water=1, juice=2, lemonade=3 )  
> names(x)  
[1] "water"      "juice"      "lemonade"  
>  
> x["juice"]  
juice  
      2
```

❑ Empty index

```
> x = 1:10
```

```
>x
```

```
[1] 1 2 3 4 5 6 7 8 9 10
```

```
> x[]
```

```
[1] 1 2 3 4 5 6 7 8 9 10
```

A screenshot of an R console window with a light blue header bar containing the R logo and the text "R Console". The console shows the following commands and output in a monospaced font: the command "> x = 1:10" in red, followed by "> x" in red, which produces the output "[1] 1 2 3 4 5 6 7 8 9 10" in blue. Then, the command ">" is entered in red, followed by "> x[]" in red, which produces the output "[1] 1 2 3 4 5 6 7 8 9 10" in blue.

```
R Console  
  
> x = 1:10  
> x  
[1] 1 2 3 4 5 6 7 8 9 10  
>  
> x[]  
[1] 1 2 3 4 5 6 7 8 9 10
```

❑ Mixed mode

List can be heterogeneous (mixed modes).

We can start with a heterogeneous list, give it dimensions, and thus create a heterogeneous list that is a mixture of numeric and character data:

Example

```
> ab = list(1, 2, 3, "X", "Y", "Z")
```

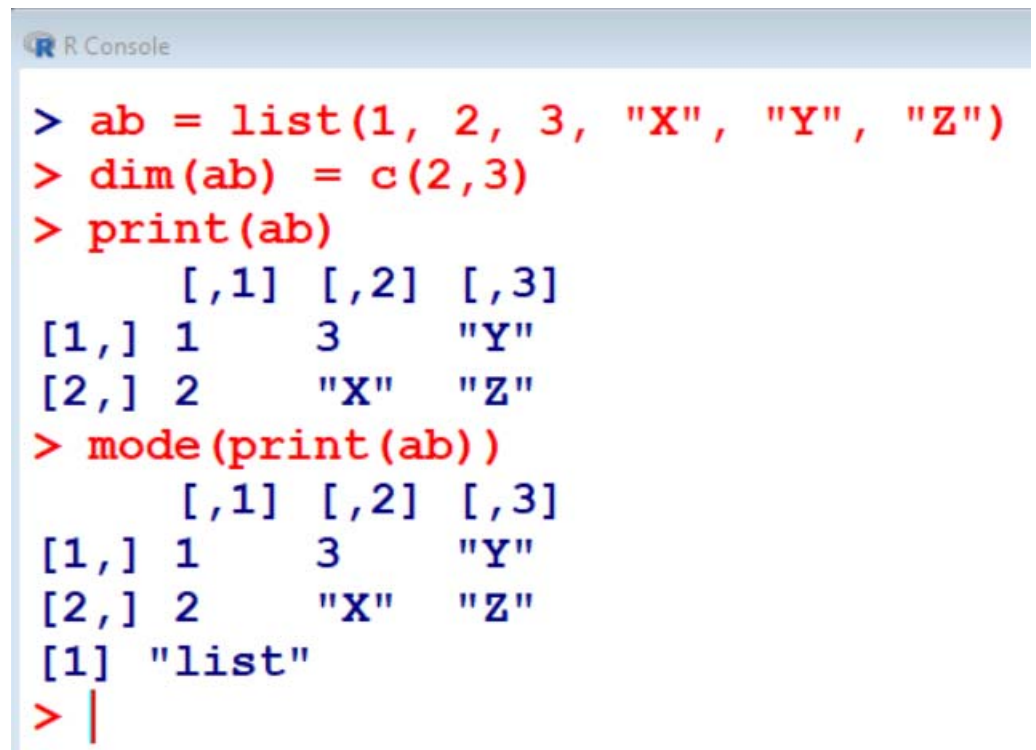
```
> dim(ab) = c(2,3)
```

```
> print(ab)
```

	[, 1]	[, 2]	[, 3]
[1,]	1	3	"Y"
[2,]	2	"X"	"Z"

❑ Mixed mode

```
> mode(print(ab))  
      [,1] [,2] [,3]  
[1,] 1     3    "Y"  
[2,] 2     "X"    "Z"  
[1] "list"
```

A screenshot of an R console window showing the execution of R code. The code defines a list 'ab' with elements 1, 2, 3, 'X', 'Y', and 'Z', sets its dimensions to 2x3, prints it, and then checks its mode. The output shows the list structure and the mode 'list'.

```
R Console  
  
> ab = list(1, 2, 3, "X", "Y", "Z")  
> dim(ab) = c(2,3)  
> print(ab)  
      [,1] [,2] [,3]  
[1,] 1     3    "Y"  
[2,] 2     "X"    "Z"  
> mode(print(ab))  
      [,1] [,2] [,3]  
[1,] 1     3    "Y"  
[2,] 2     "X"    "Z"  
[1] "list"  
> |
```

❑ Matrices created from Lists

R Console

```
> ab = list(1, 2, 3, "X", "Y", "Z")  
> dim(ab) = c(2,3)  
> print(ab)
```

	[,1]	[,2]	[,3]
[1,]	1	3	"Y"
[2,]	2	"X"	"Z"