Foundations of R Software

Lecture 10

Basics of Calculations

::::

R as a Calculator with Scalars and Data Vectors : Power operations, Integer and Modulo divisions

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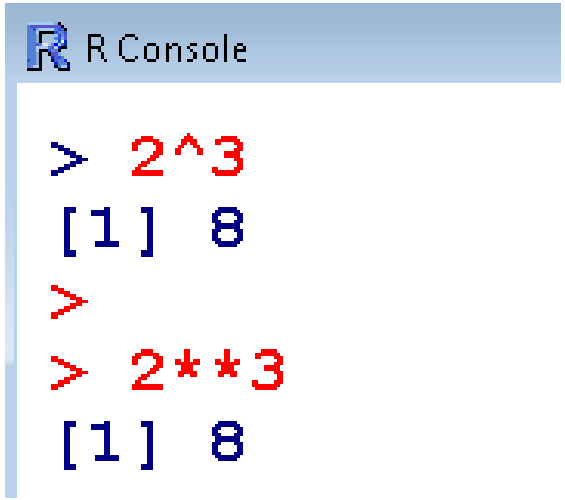
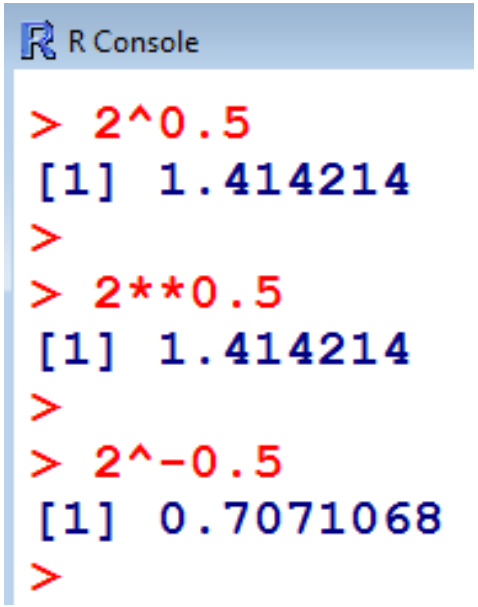
R as a calculator

```
> 2^3           # Command for power operator
[1] 8           # Output

> 2**3          # Command for power operator
[1] 8           # Output
```



R as a calculator

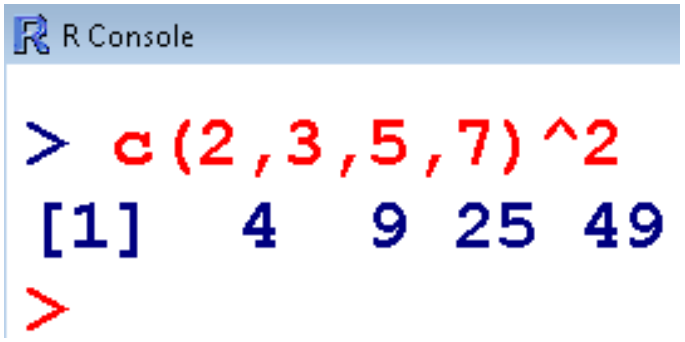
```
> 2^0.5          # Command for power operator
[1] 1.414214     # Output

> 2**0.5         # Command for power operator
[1] 1.414214     # Output

> 2^-0.5         # Command for power operator[1]
0.7071068 # Output
```



Power operator with scalar

```
> c(2,3,5,7)^2      # command: application to a
                    vector
[1] 4 9 25 49       # output
```

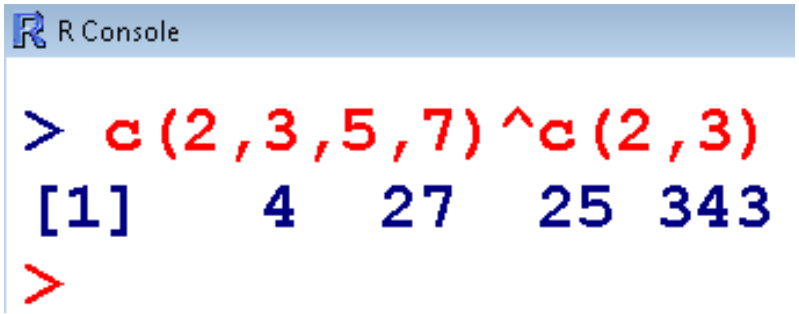
$$2^2,\ 3^2,\ 5^2,\ 7^2$$



Power operation with vector

```
> c(2,3,5,7)^c(2,3)  # !!ATTENTION! Observe the
                       operation
[1]  4 27 25 343      # output
```

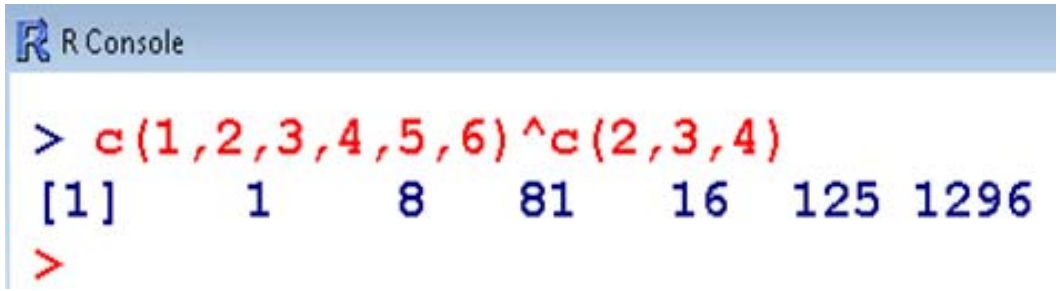
$2^2,\ 3^3,\ 5^2,\ 7^3$



Power operation with vector

```
> c(1,2,3,4,5,6)^c(2,3,4) # command: application
                          to a vector with vector
[1]  1 8 81 16 125 1296   # output
```

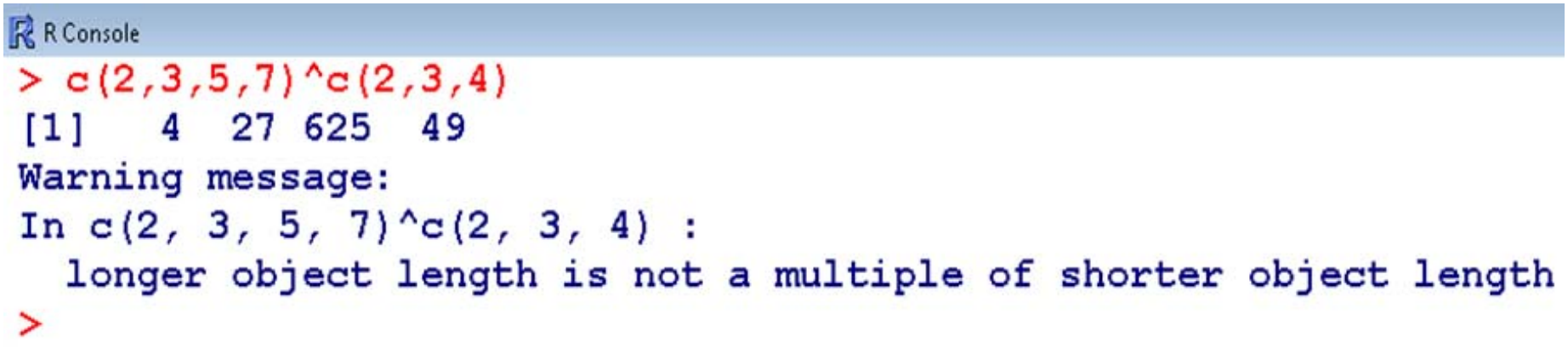
$$1^2,\ 2^3,\ 3^4,\ 4^2,\ 5^3,\ 6^4$$



Power operation with vector

```
> c(2,3,5,7)^c(2,3,4)      #error message
[1]   4 27 625 49          # output
Warning message:
longer object length is not a multiple of
shorter object length in: c(2,3,5,7)^c(2,3,4)
```

$2^2,\ 3^3,\ 5^4,\ 7^2$

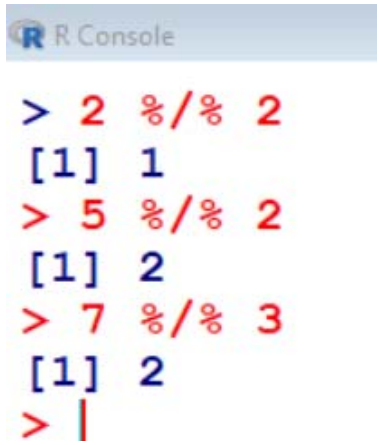


Integer division with scalar

Integer Division: Division in which the fractional part (remainder) is discarded

Operator : %/%

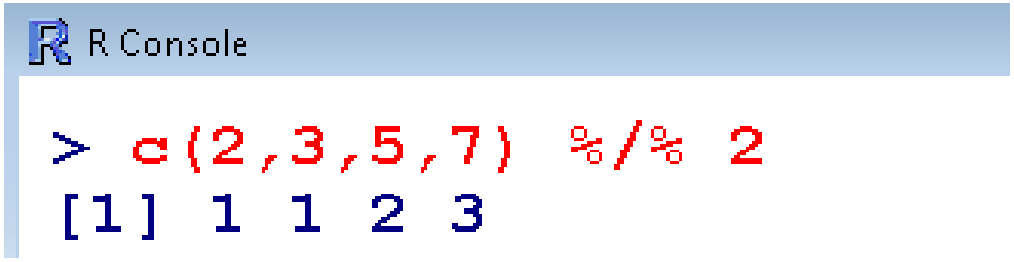
```
> 2 %/% 2
[1] 1

> 5 %/% 2
[1] 2

> 7 %/% 3
[1] 2
```



Integer division with scalar

```
> c(2,3,5,7) %/% 2
[1] 1 1 2 3
```

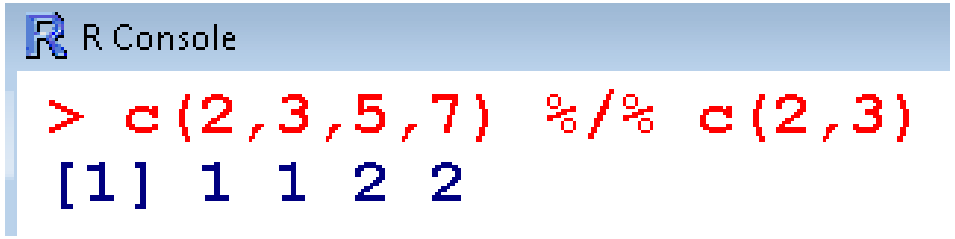
$$2\%/\%2, \quad 3\%/\%2, \quad 5\%/\%2, \quad 7\%/\%2$$



Integer division with data vector

```
> c(2,3,5,7) %/% c(2,3)
[1] 1 1 2 2
```

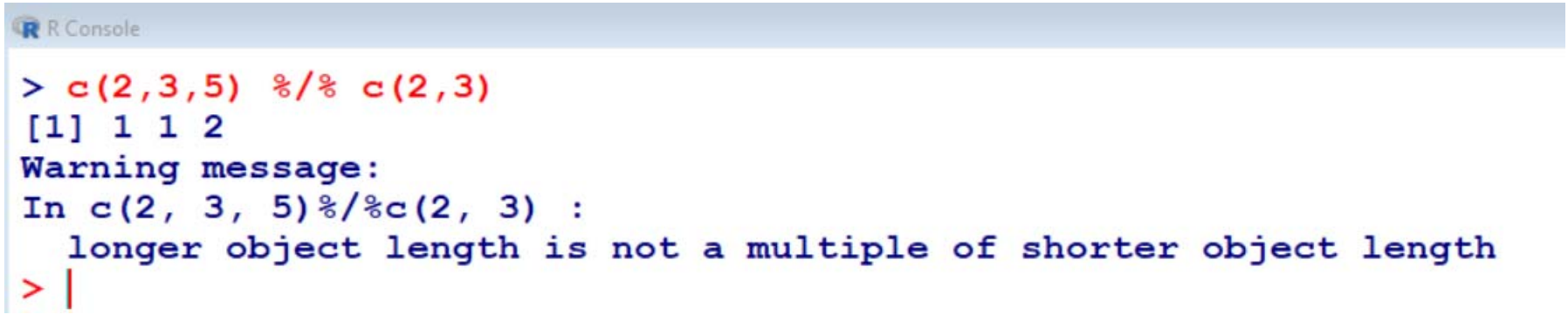
$2\%/\%2, \quad 3\%/\%3, \quad 5\%/\%2, \quad 7\%/\%3$



Integer division with data vector

```
> c(2,3,5) %/% c(2,3)
[1] 1 1 2
Warning message:
In c(2, 3, 5)%/%c(2, 3) :
  longer object length is not a multiple of
shorter object length
```

$2\%/\%2, \quad 3\%/\%3, \quad 5\%/\%2$

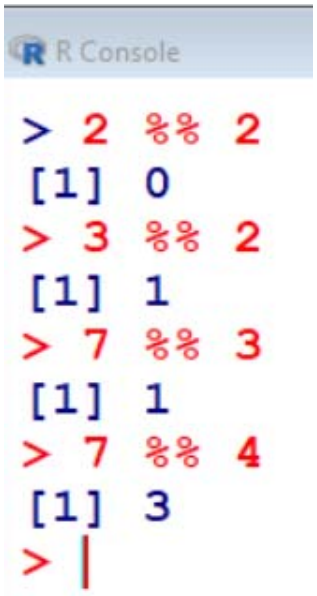


Modulo Division (x mod y) with scalars

Modulo Division: modulo operation finds the remainder after division of one number by another.

Operator : %%

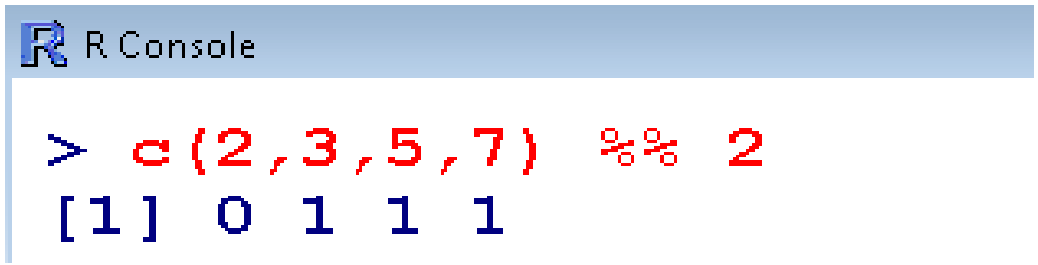
```
> 2 %% 2
[1] 0

> 3 %% 2
[1] 1

> 7 %% 3
[1] 1

> 7 %% 4
[1] 3
```



Modulo Division (x mod y) with scalars

```
> c(2,3,5,7) %% 2
  [1] 0 1 1 1
```

2%%2, 3%%2, 5%%2, 7%%2

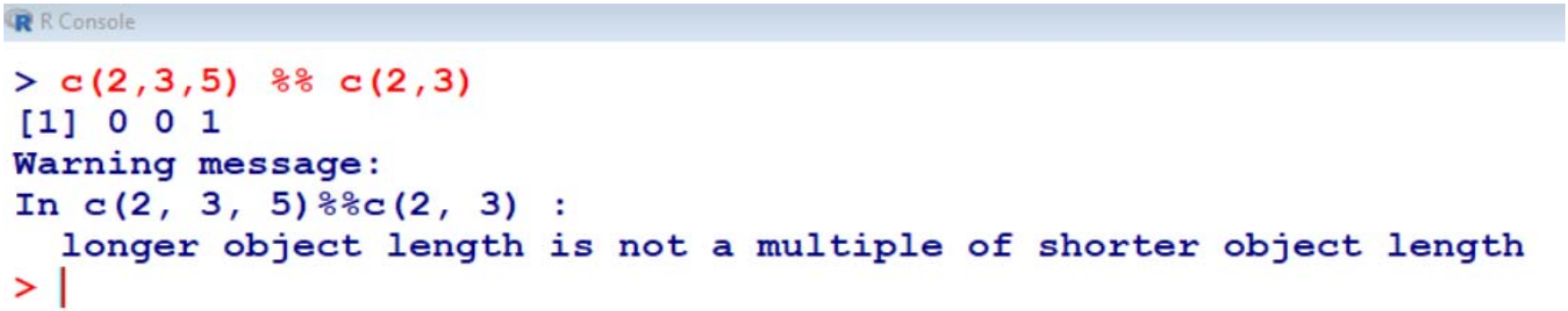


Modulo Division (x mod y) with data vectors

```
> c(2,3,5,7) %% c(2,3)
  [1] 0 0 1 1
```

2%%2, 3%%3, 5%%2, 7%%3

Modulo Division (x mod y) with data vectors

```
> c(2,3,5) %% c(2,3)
  [1] 0 0 1
Warning message:
In c(2, 3, 5)%%c(2, 3) :
  longer object length is not a multiple of
shorter object length
```

2%%2, 3%%3, 5%%2